

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Forests in the ECE Region

Trends and Challenges in Achieving the
Global Objectives on Forests



UNITED NATIONS

FORESTS IN THE ECE REGION: TRENDS AND CHALLENGES IN ACHIEVING THE GLOBAL OBJECTIVES ON FORESTS

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ABSTRACT

This study is the contribution of the ECE Region to the Eleventh Session of the United Nations Forum on Forests. Using the best available data, it examines progress of the forest sector in the ECE Region towards the achievement of the four Global Objectives on Forests, adopted by the United Nations General Assembly in 2007. On the basis of this assessment as well as the forest sector outlooks and policy commitments by ECE member States, thirteen major challenges for the forest sector in the region are identified and analysed. The study provides policy recommendations for consideration in the discussions by UNFF.

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LIST OF ACRONYMS AND ABBREVIATIONS

BREEAM	Building Research Establishment Environmental Assessment Method
C	carbon
CBD	The Convention on Biological Diversity
CDM	Clean Development Mechanism
CEPF	European Confederation of Forest Owners
CIS	Commonwealth of Independent States
CITES	Convention on International Trade in Endangered Species
COC	chain of custody
COFFI	Committee on Forests and the Forest Industry
CPF	Collaborative Partnership on Forests
CSO	civil society organizations
DAC	Development Assistance Committee
EFC	European Forestry Commission
EFI	European Forest Institute
EFSOS	European Forest Sector Outlook Study
ETS	emission trading system
EUTR	European Union Timber Regulation
FAO	Food and Agriculture Organization of the United Nations
FLEGT	Forest Law Enforcement, Governance and Trade
FMP	forest management plan

LIST OF ACRONYMS AND ABBREVIATIONS

FRA	Forest Resources Assessment
FSC	Forest Stewardship Council
FTE	full time equivalent
GDP	gross domestic product
GNP	gross national product
GOF	Global Objectives on Forests
G T	gigatonne
GVA	gross value-added
IAF	International Arrangement on Forests
IPCC	The Intergovernmental Panel on Climate Change
ITTO	International Tropical Timber Organization
IUCN	International Union for Conservation of Nature
JWEE	Joint Wood Energy Enquiry
LCA	life-cycle assessment
LEED	Leadership in Energy and Environmental Design
MCPFE	Ministerial Conference on the Protection of Forests
MT	megatonne
NAFSOS	North American Forest Sector Outlook Study
NAI	net annual increment
NLBI	Non Legally Binding Instrument

LIST OF ACRONYMS AND ABBREVIATIONS

NWFP	non-wood forest products
ODA	official development assistance
OECD	The Organisation for Economic Co-Operation and Development
PEFC	Programme for the Endorsement of Forest Certification
PES	payment for ecosystem services
RPA	Resources Planning Act
RUFSOS	Russian Forest Sector Outlook Study
SFM	sustainable forest management
UNCCD	United Nations Convention to Combat Desertification
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change
USDA	United States Department of Agriculture
VPA	voluntary partnership agreement

FOREWORD

BY UNFF SECRETARIAT

The United Nations Forum on Forests will review the effectiveness of the current International Arrangement on Forests (IAF) this year at its 11th Session (UNFF11). A central part of the IAF is the Non Legally Binding Instrument on All Types of Forests (Forest Instrument), adopted in 2007 by the General Assembly, with its commitment to the four Global Objectives on Forests, the first formal commitment on forest issues at the global level. Fifteen years after the establishment of the original IAF, and nearly 25 years after the Rio Conference which launched the global dialogue on forests, it is time to review what has happened on the ground, in objective terms, using the global commitments as a framework. Are we moving in the right direction? Where are the successes, where are the challenges and how do we address them? The answers to these questions should be the foundation of the post-2015 international arrangement on forests.

UNFF is carrying out the review of the IAF at the global level through three major components: submissions by countries and relevant stakeholders, such as the Collaborative Partnership on Forests (CPF) and its member organizations and major groups; an open-ended intergovernmental ad hoc expert group; and an independent assessment of the IAF. An important dimension of the review is the regional one: regions bring together countries with economic, social and ecological similarities, and enable a different type of analysis, more focused and closer to reality. Increasingly, UNFF is adopting a regional approach, which may be strengthened in future.

For that reason, I welcome the initiative by the UNECE Committee on Forests and the Forest Industry (COFFI), and the FAO European Forestry Commission (EFC), supported by the Joint UNECE/FAO Forestry and Timber Section, to prepare a regional input to UNFF11. This study, based on the best available and most recent data, will enrich the discussions of UNFF11. It also highlights developments in the ECE Region, which traditionally has not been at the centre of the global dialogue, as this has focused on urgent tropical forest issues. The ECE Region contains about half of the world's forests, and has its own set of issues and challenges, which are clearly formulated in this study. The constructive cooperation between bodies of the UN system, national governments and stakeholders, including regional forest sector processes, shows what can be done at the regional level, and could be an example for other regions.

I take this opportunity to thank, on behalf of the UNFF Secretariat, all those who have made this study possible, notably the UNECE COFFI, the FAO EFC, their Joint Section, the member States, and the forest expert community in the ECE region.

A handwritten signature in black ink, appearing to read 'Manoel Sobral Filho', written in a cursive style.

Manoel Sobral Filho

Director, United Nations Forum on Forests Secretariat

FOREWORD

BY UNECE AND FAO

The ECE Region is rich in forest resources with a forest area of 1.89 billion ha – an astounding 41.4% of the global total. Further, the majority of the global wood based production is located in the region and there is increasing recognition of the value of natural capital and forest ecosystem services. Yet the forest sector, as well as many outside of it, is ever more concerned with changes in market prices and supply and demand patterns, production processes and investment as well as the need to improve livelihoods and address the impacts of climate change and loss of biodiversity in the region.

At the global level, the United Nations Forum on Forests (UNFF) is currently engaged in a review of the International Arrangement on Forests for discussion at its 11th Session in May 2015. And what happens at the global level should promote further action and engagement at the regional level. Thus, the FAO European Forestry Commission and the UNECE Committee on Forests and the Forest Industry, at their joint session in Rovaniemi in December 2013, mandated the Joint UNECE/FAO Forestry and Timber Section to develop an ECE Region wide study on progress towards the achievement of the Global Objectives on Forests and sustainable forest management, and on existing challenges for forests and the forest sector. The results of this study are contained in this joint publication, serving as a regional input to the discussions on the global forest related arrangements.

In addition to the status and trends of forest resources in the region, this peer-reviewed study focuses on the social, economic and environmental aspects of forestry, and the sustainability and financing of forest management. It has been developed as the collaborative effort of lead experts on the issues, from all parts of the region, supported by national correspondents and the UNECE/FAO Team of Specialists on Monitoring of Sustainable Forest Management.

It is essential, in our view, to ensure that information and analysis about forests in the ECE region are developed and shared with relevant global forums related to forest policy and governance. We hope it will help lay the groundwork for finding opportunities to address current challenges in achieving the Global Objectives on Forests during the review of the International Arrangement on Forests, by exchanging experiences and evidence from ongoing studies in the region. It is also timely given the current negotiations on the post 2015 development agenda and its Sustainable Development Goals, including those relevant for forests and the forest sector. We firmly believe that forests, managed in a sustainable manner with full recognition of all the benefits they provide - social, environmental and economic - continue to have a significant role to play in our path towards sustainable development.



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ACKNOWLEDGEMENTS

This study is the result of the active cooperation of many people, and is based on the results of decades of international cooperation in many institutions and forums, notably the UNECE Committee on Forests and the Forest Industries, and the FAO European Forestry Commission, which have been working together to serve the forest sector of the region since 1947.

The work was carried out by a small team led by Kit Prins, who was the coordinating lead author of the study. The project manager was Roman Michalak. The authors were Andrey Filipchuk (forest area and trends), Gert-Jan Nabuurs (climate change, carbon stocks and flows), Jari Parviainen (conservation of biodiversity), Guy Robertson (global objective 2) and Markku Simula (global objective 4, certification, consumption of sustainably produced products). Markus Lier compiled, reviewed and processed the source data. The editorial work was carried out by Matthew Fonseca, the publication was graphically designed by Carolina Rodriguez and Valentina Frigerio (blossoming.it), and Christophe Barrull organized and supervised the printing process of the study.

The work was carried out under the direction of Paola Deda, Acting Director of the UNECE Forests, Land and Housing Division, Ivonne Higuero, Chief of the UNECE/FAO Forestry and Timber Section, Christoph Dürr, Chair of the Committee on Forests and Forest Industry and Rob Busink, Chair of the European Forestry Commission, as well as Heikki Granholm, former Chair of the Committee on Forests and the Forest Industry.

Thoughtful comments and suggestions were received from several countries. The study benefited from the thorough review and comments provided by: Graham Stinson, Simon

Bridge and Michael Swift (Canada), Nikolai Ivanov, Boris Moiseyev and Maria Palenova (Russian Federation). Lyubov Polyakova (Ukraine), Sheila Ward and Pat Snowdon (United Kingdom), Jeff Prestemon and Jennifer Conje (United States). The study team is grateful to all the experts and participants at the various meetings, who significantly improved the quality of the study.

Studies like this are not possible without long term structured cooperation of many experts. The best available international data sets were used, and are referenced in the study. Each of these datasets is the result of cooperation between national and international experts over many years, in addition to the major investment in collecting and analysing the basic scientific measurements. The contribution provided by the national correspondents and experts, who verified and supplemented data for the purpose of this study, also should be recognized.

The first complete draft was discussed at a workshop organised during the 2014 meeting of the UNECE/FAO Team of Specialists on Monitoring Sustainable Forest Management, and a revised draft was presented and discussed at the session of the UNECE Committee on Forests and Forest Industry in Kazan, Russian Federation in November 2014.

Finally, the study would not have been possible without the generous support provided by the Governments of Finland, Germany, the Russian Federation, Switzerland and USA. The UNECE and FAO are deeply grateful for their continued support to the organizations' efforts to promote sustainable forest management in the ECE Region.

EXECUTIVE SUMMARY

BACKGROUND AND PROCESS

In 2007, the General Assembly adopted the Non-Legally Binding Instrument on All Types of Forests (Forest Instrument), which includes four global objectives on forests that member States committed themselves to achieve. This study is the contribution of the UNECE Committee on Forests and the Forest Industry (COFFI) and the FAO European Forestry Commission (EFC) to the eleventh session of the United Nations Forum on Forests (UNFF), which will assess progress towards the global objectives as a part of the process of reviewing the International Arrangement on Forests. It has been prepared by the secretariat, using the best available international data. Countries have been consulted as regards the data; the study itself was discussed in draft form at a workshop organized by the joint UNECE/FAO Team of Specialists on Monitoring Sustainable Forest Management (21-22 October 2014 in Geneva, Switzerland) and at the 72nd session of the UNECE Committee on Forests and the Forest Industry (COFFI) held in Kazan, Russian Federation (18-21 November 2014). The final draft was circulated to countries for comment in December 2014 and those comments have been taken into account when preparing the final version.

The scope of the study is the ECE Region, which includes all members of COFFI and EFC. (Figure 1.4.1 and Annex 1)

OVERVIEW OF PROGRESS TOWARDS THE GLOBAL OBJECTIVES ON FORESTS

GLOBAL OBJECTIVE 1: REVERSE THE LOSS OF FOREST COVER WORLDWIDE THROUGH SUSTAINABLE FOREST MANAGEMENT, INCLUDING PROTECTION, RESTORATION, AFFORESTATION AND REFORESTATION, AND INCREASE EFFORTS TO PREVENT FOREST DEGRADATION

Has forest cover in the ECE Region expanded or declined? What have been the contributions of afforestation and reforestation?

Forest cover has been expanding in all parts of the region for several decades. The net increase between 2000 and 2015 was 28.1 million ha, or 1.5% of the total area of forest and other wooded land in 2000. Natural expansion onto former agricultural land accounts for most of the increase, but afforestation in the context of public programmes has played a significant role in some countries.

What are the major biomass and carbon stocks and flows connected to forests of the ECE Region, and what has been the role of forest management in their development?

The total stock of carbon in aboveground living biomass in the ECE member States amounts to 64.3 Gt of carbon and in harvested wood products to over 5 Gt. The total forest biomass carbon sink – the carbon sequestered each year by ECE Region forest ecosystems - amounts to 255 million tonnes of carbon per year between 2005 and 2010. The ECE forests are a significant carbon sink although there is uncertainty over the exact size of the sink, and its underlying causes. Forest management has the possibility to continuously maintain a carbon stock over larger forest estates, while at the same time sustainably producing wood products and biomass for bioenergy. There is a risk of unintended carbon emissions through fire, insects, wind etc.

What is the area of sustainably managed forest in the ECE Region, and how fast is it increasing?

Three ways have been used to estimate the trends in area of sustainably managed forest: about 80 per cent of the ECE forests are already under forest management plans or equivalent. Between 2006 and 2013, the area of forests certified as sustainably managed in the ECE Region expanded by 45%. Almost all ECE member States are members of one or more regional processes of criteria and indicators of sustainable forest management, notably the Montréal Process and FOREST EUROPE. Taken together these trends indicate that there are very significant areas of sustainably managed forest in the ECE Region, and that this share has been growing over the past two decades – or that there is a stronger ability and determination to demonstrate this trend.

How much forest degradation is taking place in the ECE Region, and what protection and restoration is being undertaken?

There is no objective information on forest degradation, as there are major problems of definition and measurement. It is clear, however, that in the ECE Region there are local or regional occurrences of forest degradation from a variety of causes including fire, insects and storms, but also fragmentation around urban areas, mining, radiation, land mines and other damage from war and conflict.

GLOBAL OBJECTIVE 2: ENHANCE FOREST-BASED ECONOMIC, SOCIAL AND ENVIRONMENTAL BENEFITS, INCLUDING BY IMPROVING THE LIVELIHOODS OF FOREST DEPENDENT PEOPLE

Have the economic benefits supplied by ECE Region forests increased or decreased?

The forest sector's contribution to GDP in the ECE Region has fallen in absolute terms, and its share in the Region's economy has declined from 1.2% to 0.8% over a decade. Employment in the forest sector has fallen as well, notably because of higher labour productivity. The recession which started in 2008 has also increased unemployment and economic hardship in forest dependent communities and regions.

Have the social benefits supplied by ECE Region forests increased or decreased?

There has probably been increased access to forests for recreation, as more people in urban areas use forests. Forest management planning increasingly recognises amenity and use values. However, forest fragmentation and degradation of forest health may be reducing the social benefits available in some areas. Safety and health of forest workers are a cause for concern.

Have the environmental benefits supplied by ECE Region forests increased or decreased?

The area of protected forests has increased and supply of environmental benefits is increasingly considered in management strategies. Conservation credit exchanges and payment for environmental services are discussed a lot, but are still rare in practice. There is continuing pressure on forest habitats. Forest fragmentation, degradation and the conversion of primary forests to secondary or plantation forests will also reduce the supply of environmental benefits, particularly with regard to the conservation of native biodiversity.

Have the livelihoods of forest dependent people been improved?

This issue is being increasingly recognised in the ECE Region, but so far has been little analysed. Endemic poverty persists in many indigenous communities and other rural forested areas. Sharp declines in forest sector employment have resulted in reduced livelihoods and caused hardship to unemployed workers and their communities, particularly in timber dependent areas.

Does the forest sector in the ECE Region contribute to climate change mitigation?

Forest ecosystems sequester carbon from the atmosphere, and store it over long periods, in the forest ecosystem, and, after harvest, in forest products. In addition, the use of products and energy from sustainably managed forests to substitute for non-renewable materials and energy sources contributes to climate change mitigation. There is potential to further develop all these approaches, although, there are tradeoffs between these strategic objectives as well as with other forest management objectives.

GLOBAL OBJECTIVE 3: INCREASE SIGNIFICANTLY THE AREA OF PROTECTED FORESTS WORLDWIDE AND OTHER AREAS OF SUSTAINABLY MANAGED FORESTS, AS WELL AS THE PROPORTION OF FOREST PRODUCTS FROM SUSTAINABLY MANAGED FORESTS

Has the area of forests protected for conservation of biodiversity, including by active management, increased or decreased?

Integrated forest management approaches, emphasizing the biodiversity component, have expanded in the whole ECE Region during the last 20 years. The benefits for biodiversity can already be seen in the recorded increase of the dead wood component in commercially managed semi-natural forests. The area of forests protected for biodiversity has increased continually during the 20 years period in the whole ECE Region, to about

12% in 2015. In some ECE countries the international commitments on biodiversity, notably the Aichi biodiversity targets, are being implemented, although there is no authoritative progress report yet. In others, however, much remains to be done.

Has the share of consumption of products from sustainably managed forests increased?

There are many indications that the share of consumption of forest products from sustainably managed forest has increased significantly over the last decade. The potential supply of certified forest products increased by about 30% between 2007 and 2013. The number of chain of custody certificates grew even faster: the total was 3.5 times more in 2014 than in 2006. In addition, an increasing number of public sector initiatives, notably the US Lacey Act and the EU Timber Regulation, are promoting consumption of sustainably produced forest products and discouraging unsustainably produced forest products. Rules for green public procurement have been changed to allow, in some circumstances, preference for sustainably produced products.

GLOBAL OBJECTIVE 4: REVERSE THE DECLINE IN OFFICIAL DEVELOPMENT ASSISTANCE FOR SUSTAINABLE FOREST MANAGEMENT AND MOBILIZE SIGNIFICANTLY INCREASED, NEW AND ADDITIONAL FINANCIAL RESOURCES FROM ALL SOURCES FOR THE IMPLEMENTATION OF SUSTAINABLE FOREST MANAGEMENT

What are the trends for official development assistance for sustainable forest management?

The total annual bilateral ODA to forestry from the ECE countries in 2011-2012 was more than five times the volume in 2005-07. In 2009-12 the ECE countries represented 75-80% of the total bilateral forestry ODA. The total amount of ODA for sustainable forest management is certainly higher, as ODA for forestry is also reported under other headings, such as climate change (e.g. REDD+), and the figures above do not include multilateral development assistance.

What financial resources from all sources have been supplied for the implementation of sustainable forest management inside the ECE Region?

Domestic public financing includes budgets for state forest organisations (when they are not self supporting), support to R&D and transfer payments to private owners. Payment for environmental and social services provided by forests is being developed slowly. Most private financing has come from private forest owners, notably through wood sales revenue. However, investment by private financial institutions is rapidly growing in importance.

CHALLENGES AND OPPORTUNITIES FOR THE ECE REGION IN IMPLEMENTING THE GLOBAL OBJECTIVES

On the basis of the developments summarized above, as well as the outlook and policy commitments by ECE member States, a number of major challenges for the ECE Region forest sector were identified. They are presented below, in summary form. It should be

stressed that these are challenges which are difficult yet desirable to achieve; even though they are not formal commitments by ECE Region governments or stakeholders.

1 Protect the forests

Governments and forest managers must act strategically to protect the forests of the ECE Region from all threats, notably those linked to climate change, and increase the resilience of forests faced by changes which are hard to predict at present. Strategies should be adaptive: their success or failure should be monitored, and the strategies changed, if necessary, in the light of experience.

2 Contribute to climate change mitigation through carbon sequestration and storage in forests and products, and through substitution.

The ECE Region forest sector is already contributing to climate change mitigation by carbon sequestration and storage in forests and products, and by substituting for non-renewable materials and energy. However, it is clear that the contribution could be significantly increased in all four areas. There are also challenges arising from tradeoffs between the four main directions, as well as between them and other forest functions, notably conservation of biodiversity.

3 Mobilise significantly more wood for energy, on a sustainable basis

To reach the renewable energy goals, the volume of wood supplied and used as a source of energy would have to increase significantly over a relatively short period. To achieve these ambitious goals some or all of the following would be needed: unprecedented wood mobilisation from private forests, using more of the tree biomass, even stumps; using all residues for raw material or energy; and improving the recovery of wood products after use. The policy challenge is to reconcile the objectives for renewable energy, sustainable forest management, wood products industries, and trade, which sometimes conflict and, if so decided, to make a significant investment of resources and political will to mobilise significant volumes of wood for energy, without unacceptable damage to other parts of the forest sector, or the environment, inside and outside the ECE Region.

4 Exclude all unsustainably produced forest products from ECE Region markets, while helping countries outside the region to fight illegal logging and other unsustainable practices

Over the past decade, significant progress has been made in fighting illegal logging, and other unsustainable practices, inside and outside the ECE Region. The challenges facing the region with regard to sustainably produced forest products are: to finish putting in place effective and fair market access regulations, removing all loopholes, to continue to help exporting countries in developing regions to achieve sustainable forest management (thereby gaining full access to ECE Region markets), and to ensure that wood based products do not face unfair restrictions on consumer markets because of the cost of achieving and demonstrating sustainable forest management.

5 Promote the consumption of sustainably produced forest products

Increased consumption of forest products from sustainable sources contributes to climate change mitigation, the economic sustainability of the forest sector, job creation or maintenance, and the development of the green economy, and should therefore be promoted. The promotion efforts should be devoted to communication and marketing, but also to regulatory questions.

6 Take the lead in developing the green economy, sharing experience with other sectors, and learning from them

The emerging “Green Economy” will necessitate new approaches in every sector to improve human well-being and social equity while significantly reducing environmental risks and ecological scarcities. The forest sector already displays many green characteristics. However, the sector should become more “green”; indeed take the lead in certain respects. The Rovaniemi Action Plan for the Forest Sector in a Green Economy suggests a wide range of activities by all parts of the forest sector, to be undertaken on a voluntary basis through *ad hoc* partnerships. The policy challenge is to implement the Rovaniemi Action Plan to a broad extent, with the active involvement of the private sector, civil society and all stakeholders.

7 Put the forest work force on a sustainable basis, dramatically improving safety and health of forest workers, and providing necessary skills for a changing world

The forest workforce in the ECE Region has significant problems with occupational safety and health. Forest workers often have lower than average wages, relatively low social prestige, and have to work in remote areas, in uncomfortable conditions. It has become difficult to recruit enough forest workers with appropriate skills for the changing forest work, the average age of the work force is growing and some forest managers may be uneasy in their changing roles. The challenges in developing a sustainable forest workforce are to make forest jobs more attractive, to adapt training and education to bring them into line with the changing requirements, to redesign forestry training to cover the new skills required by forest managers, and to work more closely with other disciplines.

8 Continue to help countries in other regions achieve sustainable forest management

Despite the recorded increase in bilateral ODA, and the many multilateral ODA and capacity building exercises, deforestation, illegal logging and other unsustainable practices continue in many regions. Reversing deforestation must be a priority, even in those regions, like the ECE Region, where forest area is stable or expanding. The challenge to Governments and the forest sector in the ECE Region is to support and facilitate the efforts to halt deforestation, through financial and technical assistance, sharing of experience and capacity building, increasing the effectiveness of the funds supplied, and in particular, to maintain or increase levels of funding, whether bilateral or multilateral ODA or private investment.

9 Seek mechanisms to finance forest functions on a fair and sustainable basis, for example through valuation of forest ecosystem services and payment for ecosystem services

The valuation of ecosystem services provided by forests, i.e. the benefits derived from the forest, should be promoted and applied so as to provide a basis for capturing these values. In so doing, the so far invisible benefits of forests are made visible, and measures to support and finance sustainable forest management through instruments such as payments for ecosystem services could then be put in place. The challenge facing ECE Region governments, forest owners and forest stakeholders is to develop and establish, in an equitable and efficient way, a transparent and objective institutional and governance system to achieve this.

10 Build capacity throughout the ECE Region

The challenge for several ECE countries, mostly in the Balkans, around the Caucasus and in Central Asia is to put their forest sectors on the path to sustainable forest management, as they are threatened by factors including remoteness and lack of infrastructure, transition and changes in structures and society, including the need to improve governance, illegal logging, lack of and threat to protective functions because of low forest cover, and lack of priority for the forest sector in national development plans. The challenge for other ECE countries is to support them in this effort. A necessary first step is to ensure that national development plans recognise the importance of forest sector issues. Sustainable forest management should be addressed at the highest policy level, because of, not despite, the low forest cover in many of these countries.

11 Develop a culture of innovation, in the face of structural change

The actors of the forest sector must function in an increasingly competitive and rapidly changing political, economic and technological environment, sometimes dominated by large, extremely dynamic, enterprises with a culture of rapid and successful innovation. The policy challenge for the development of a culture of innovation is to put in place the necessary framework conditions, such as finance, skills and workforce, and to promote the necessary innovative spirit, while maintaining the commitment to sustainable forest management.

12 Address the social and economic problems of forest dependent people in the ECE Region – remote rural communities, indigenous peoples and forest owners

There are pockets of deprivation in forested areas of the ECE Region, particularly in the large forest areas of North America and Russia, where climate and geography exacerbate the problem. Low revenue from forestry and closures of local mills have made the situation worse. Many indigenous peoples, notably in North America, have unresolved ownership claims on large forest areas. Millions of private forest owners in the ECE Region have holdings which are below the critical size for economic management. The challenge is to ensure that the forest is part of the solution to the problems of isolated poor rural

communities in forest areas, not a factor exacerbating their isolation and poverty.

13. Maintain and improve forest biodiversity, through protected areas and active management

There is still the potential to improve forest biodiversity in all parts of the region, by expanding protected areas, where necessary, and by expanding the use of integrated management in forests outside protected areas. The challenge with regard to biodiversity is to ensure that international commitments, notably the Aichi targets, are met, that all forest ecosystem types are properly covered in protected area networks, and that biodiversity is maintained and improved also on multi-functional forest land. The challenge is further exacerbated by the fact that dynamic forest disturbance processes in several countries pose a potential threat to native biodiversity. Global climate change may accelerate these processes. It is also a challenge to monitor progress with regard to forest biodiversity, and to base policies on a wide consensus of stakeholders, some of whom have contradictory interests, especially in a context of restrictions on public spending, which applies across the whole ECE Region.



The background features a large, bright green triangle on the left side, pointing downwards. To its right is a larger, lighter green triangle that also points downwards. In the bottom right corner, there is a dark teal triangle pointing upwards. The word "INTRODUCTION" is centered in white, uppercase letters between the two large green triangles.

INTRODUCTION

1.1 MANDATE

At their joint session in December 2013 (Metsä 2013), the UNECE Committee on Forests and the Forest Industry (COFFI) and the FAO European Forestry Commission (EFC) addressed the outcome of the 10th session of the United Nations Forum on Forests (UNFF) and its implications for the ECE Region, and in particular regional inputs to UNFF. “The joint secretariat introduced this agenda item, recalling that the publication, “Forests and Economic Development,” was prepared as regional input to the 10th meeting of the United Nations Forum on Forests (UNFF10). The joint secretariat indicated that a similar input could be prepared by the Joint UNECE/FAO Forestry and Timber Section for the next meeting of UNFF, focusing on progress made towards the achievement of the global objectives on forests and SFM, and on challenges for forests and the forest sector in the ECE Region. In the ensuing discussion, participants noted the usefulness and the high level of interest in the publication issued for UNFF10. Similarly, they underscored the importance of providing regional input to UNFF11 based on the information available in 2014. This publication should be focused on the issues described above and should not address

the general political discussion under the International Arrangement on Forests.

The Committee and the Commission mandated the Joint UNECE/FAO Forestry and Timber Section to develop a study on progress towards the achievement of the global objectives on forests and SFM, and on challenges for forests and the forest sector in the ECE Region, and to submit the draft of the study for comments to member States during 2014, in order to issue the final study in time for it to be presented at the 11th session of the UNFF in mid2015”.¹

This study has been prepared in accordance with the mandate given by Metsä 2013.

It has been prepared by a team of experts in close cooperation with the Forestry and Timber Section. A first draft was reviewed by the UNECE/FAO Team of Specialists on Monitoring Sustainable Forest Management in October 2014, and then by the COFFI session in November 2014. A revised version, taking account of these comments was circulated for written comment by countries. The final version is being made available to delegates at UNFF11 in May 2015.

1.2 BACKGROUND AND OBJECTIVES OF THE STUDY

There has been intense activity as regards sustainable forest management, at the global and regional levels, since the early 1990s. At the global level, important landmarks were the 1992 UN Conference on Environment and Development in Rio, which approved the so-called Forest Principles, leading to a series of discussions and commitments, culminating in 2007 in the approval by the UN General Assembly of the Non Legally Binding Instrument on all

Types of Forest (NLBI), wherein countries committed themselves to moving towards the four global objectives on forests, which are an integral part of the NLBI.

At the regional level, there has also been intense activity, initially centred around existing bodies such as the UNECE Committee on Forests and the Forest Industry, and the FAO Regional Forestry Commissions, including those for North

¹ ECE/TIM/2013/2 FO: EFC/2013/2, paras. 61-62

America and Europe. These bodies were joined by regional processes, notably, in the ECE Region, the Montréal Process and FOREST EUROPE, which generated commitments to sustainable forest management and attempts to define and monitor it through criteria and indicators.

There has been increasing dialogue between the global and regional processes. For instance, in 2012, the UNECE provided input to UNFF10 on forests and economic development, and there has been continuing coordination of data collection, verification and distribution, for instance through the Joint Forest Sector Questionnaire and the Combined Forest Resource Questionnaire.

In May 2015 UNFF11 will review the International Arrangement on Forests on the basis, among other things, of a review of progress towards the global objectives and regional assessment.

This study intends to contribute to this review, and in particular to:

- Describe progress towards the global

objectives, on the basis of the best available data and analysis;

- On this basis, to identify challenges and opportunities for the region, especially for policy makers;
- To pioneer a regional approach to the global objectives;
- To communicate the results to a wider public in simple clear language.

As a regional input, it will focus on the ECE Region, and not address trends and challenges in other regions.

The global objectives are not expressed as quantified targets, and do not contain a specific monitoring mechanism. Therefore to assess progress towards them in an objective way, it has been necessary to formulate questions, relevant to the global objectives, which can be answered in a quantified and objective way. Taken together, the answers to these questions provide the elements of an objective assessment of progress towards the global objectives by the ECE Region.

1.3 DATA SOURCES AND QUALITY

The foundation of the study is the regular international datasets collected by international organisations, notably, the global Forest Resources Assessment (FRA)² of FAO, FAOSTAT and the pan-European reporting arrangements. UNECE/FAO is an active partner in maintaining all these datasets. These data are backed up by data supplied directly by national authorities, other international agencies and articles in academic publications or journals. Every attempt has been made to use official data, but when these were not available, other data sources have been used. When data quality gives

uncertainty to the main conclusions, the authors have drawn attention to this in the text. Countries have been asked to check the data for their country. The complete dataset will be made available to all when the study is published.

The reference year for many tables is 2015, as country correspondents were asked to make “forecasts” for that year, when they supplied data in 2013. Given the slow pace of change in most forest related parameters, this is a justifiable approach and does not significantly reduce the accuracy of the data.

² Data from 2010 and previous editions of FRA was used for the production of the study; FRA 2015 and related reports of the Collaborative Forest Resources Questionnaire (CFRQ) partners will be released at the World Forestry Congress (September 2015) and will provide an additional source of data for countries in the ECE region.

There are a number of small member countries of UNECE and FAO, with very small forest resources, and corresponding gaps in statistics: Andorra, Holy See, Liechtenstein, Malta, Monaco, and San Marino. Where data are available for these countries, they are included in the database, and the regional totals, but developments in these countries

are not commented upon in the text. Likewise dependencies outside the region of UNECE countries, some of which have significant forest resources, are not included, either for their forests, land area or population. Nor is Greenland, which is an autonomous part of the Kingdom of Denmark, but without any forests.

1.4 COUNTRY GROUPS³

The ECE Region is large, including about half the world's forests, and is varied climatically, ecologically, socially and politically. Several member States also have wide internal variation. Three countries, Canada, Russia and the USA, each have more forest than the remaining 53 countries put together. Nevertheless, a subdivision into country groups is necessary for comprehension and analysis, even though no breakdown is perfect. The study presents information by country group, but all the analysis is based on data by country.

In this study, the ECE Region has been broken down into four country groups: ECE East, ECE Central, ECE South-East and ECE West, as shown in Figure 1.4.1. The exact list of countries is in annex 1. In addition, for the convenience of policy makers, the tables and statistical annexes also provide data for the European Union (EU-28), a subset of ECE Central. The main features of the country groups are briefly described below. Table 1.4.1 and Figures 1.4.2-1.4.5 show a few key quantities and ratios which characterise each group.

Table 1.4.1
Key data and ratios for the country groups, 2015
Source: Annex 3

	Area of forest and other wooded land	Forest cover	Ratio of forest area to population	Share of urban population	Average GNP per head
	Million ha	%	Ha/head	%	2010 \$/head
ECE East	909.2	52.9	4.5	72%	8,061
ECE Central	206.9	42.3	0.4	73%	35,371
ECE South-East	56.2	11.4	0.3	58%	7,572
ECE West	719.3	37.6	2.1	82%	48,652
ECE Region	1,891.6	41.0	1.5	73%	31,101
EU-28	181.2	42.9	0.4	74%	35,231

³ Country groups reflect the similar situation of forests and their management and are not intended to represent any existing or possible political or institutional settings.

Figure 1.4.1
Country groups used in the study

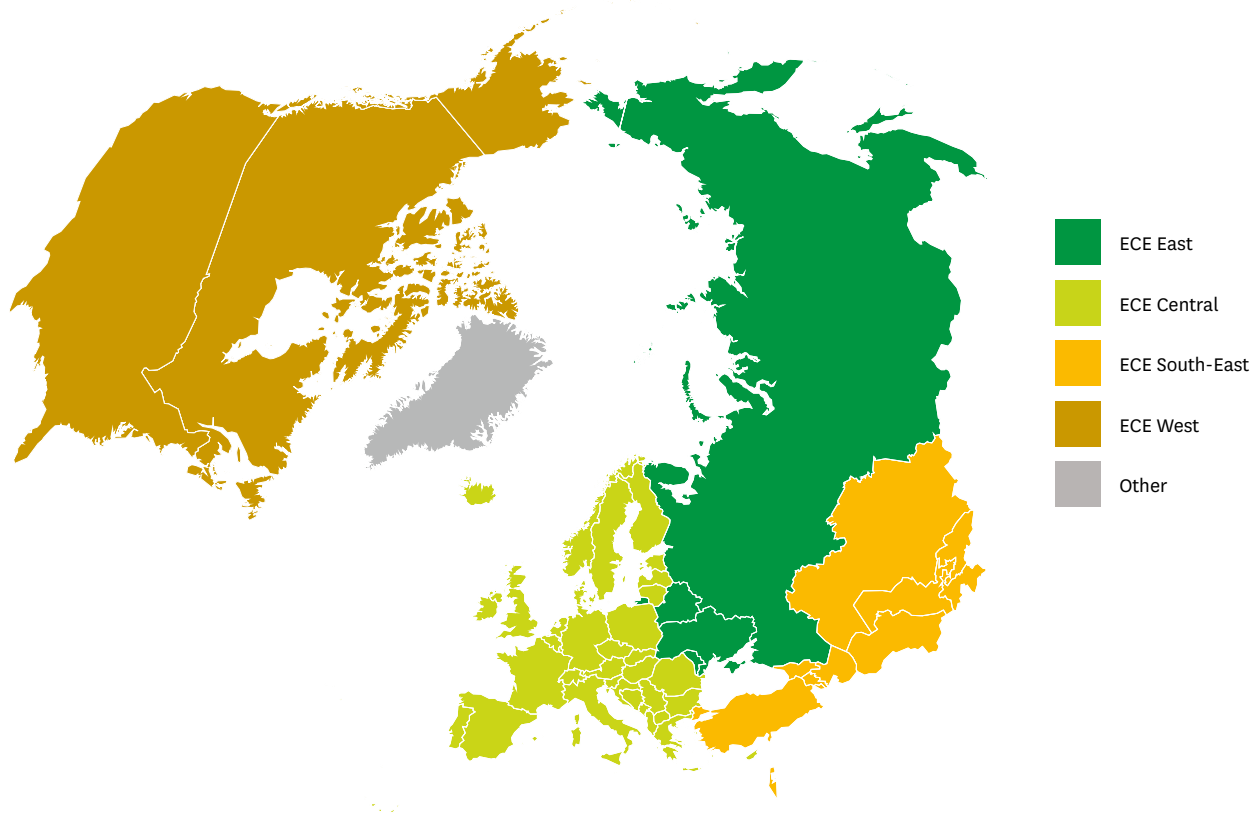


Figure 1.4.2
Forest and other wooded land in percent of land area, 2015
 Source: Annex 3

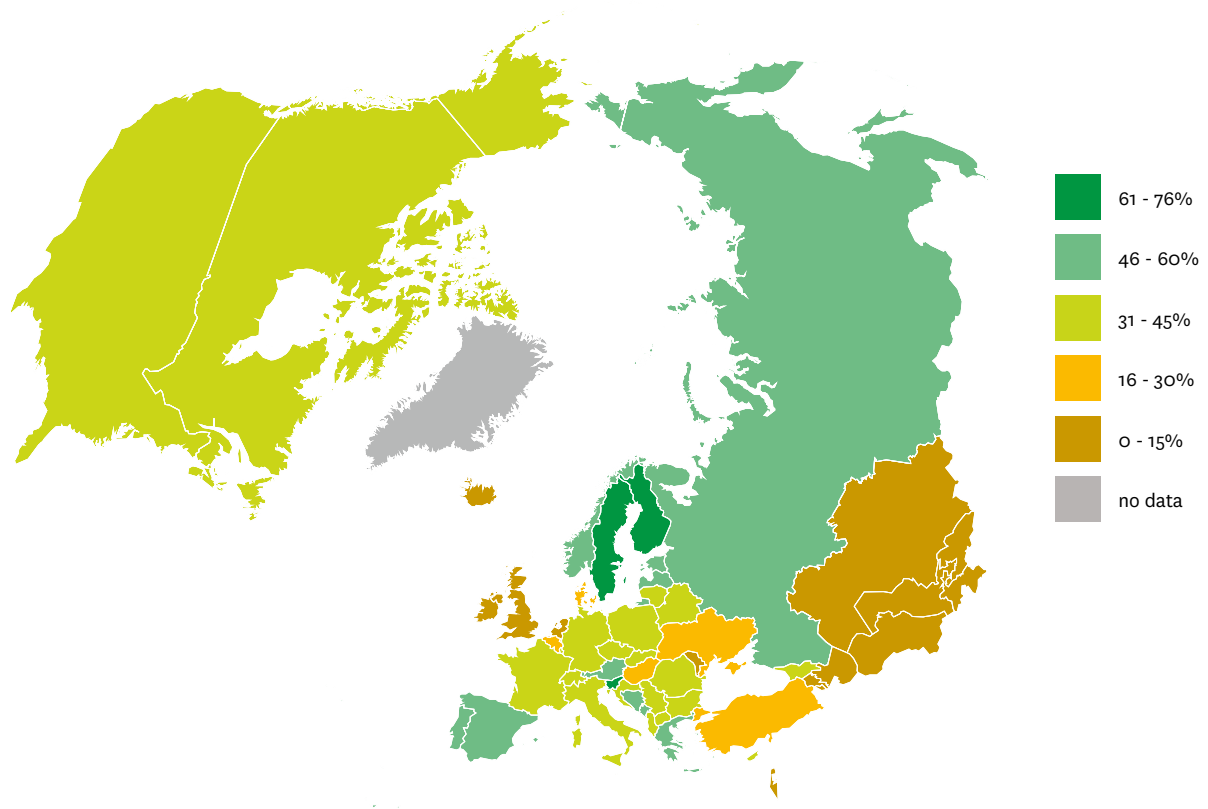


Figure 1.4.3
Forest and other wooded land per inhabitant, 2015

Source: Annex 3

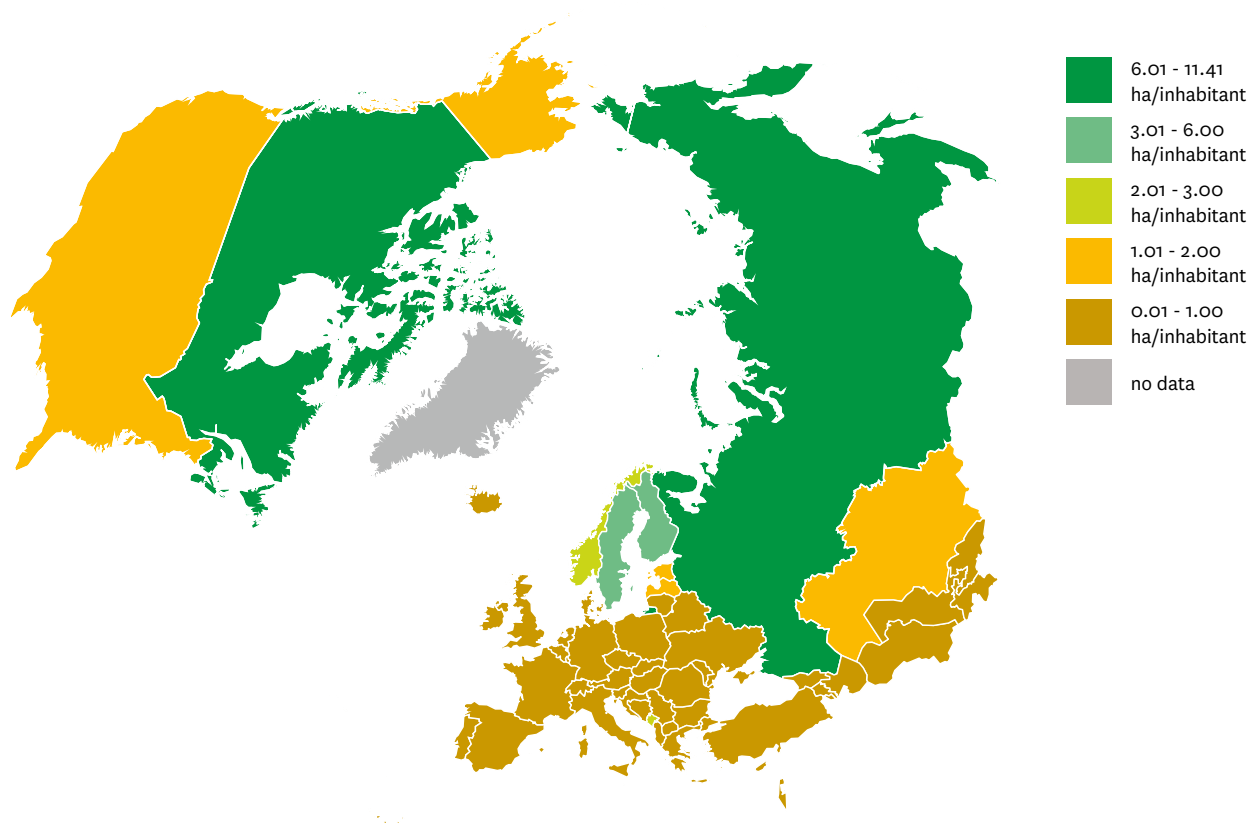


Figure 1.4.4
Share of urban population, 2010

Source: Annex 3

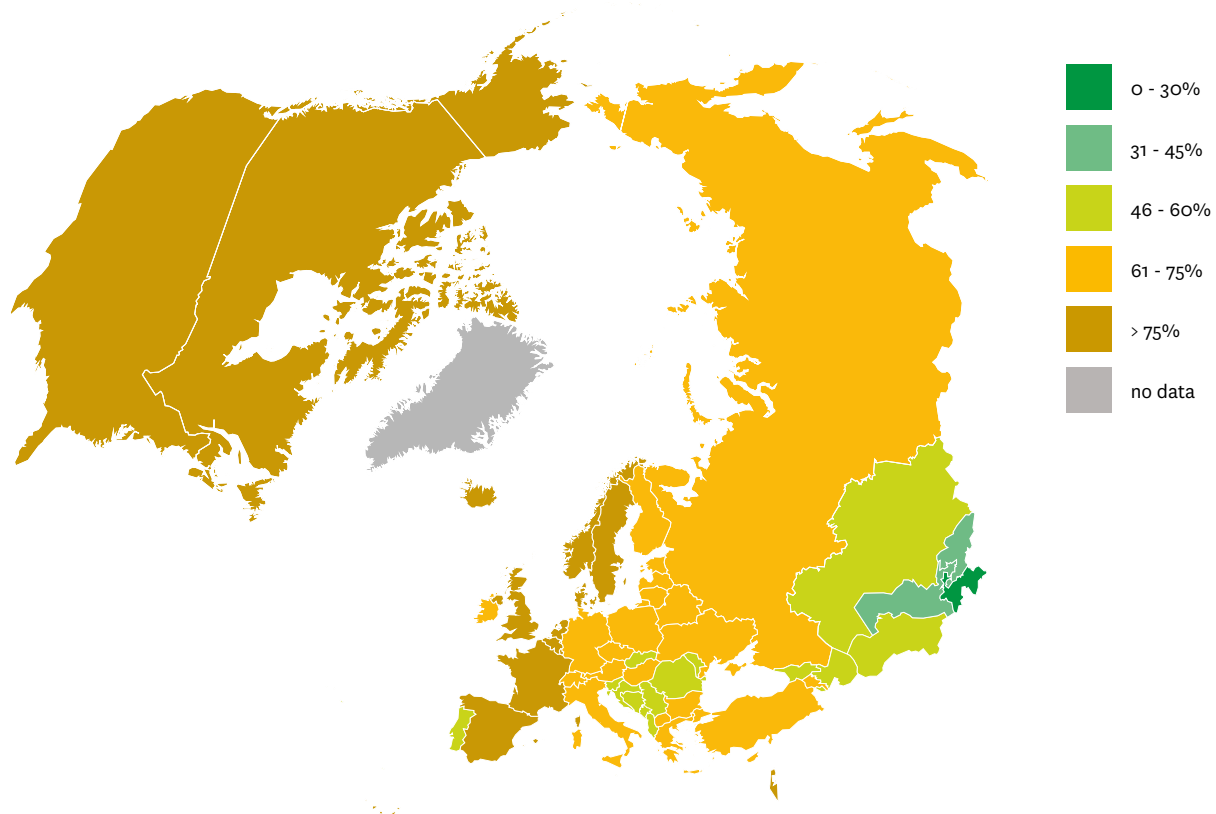
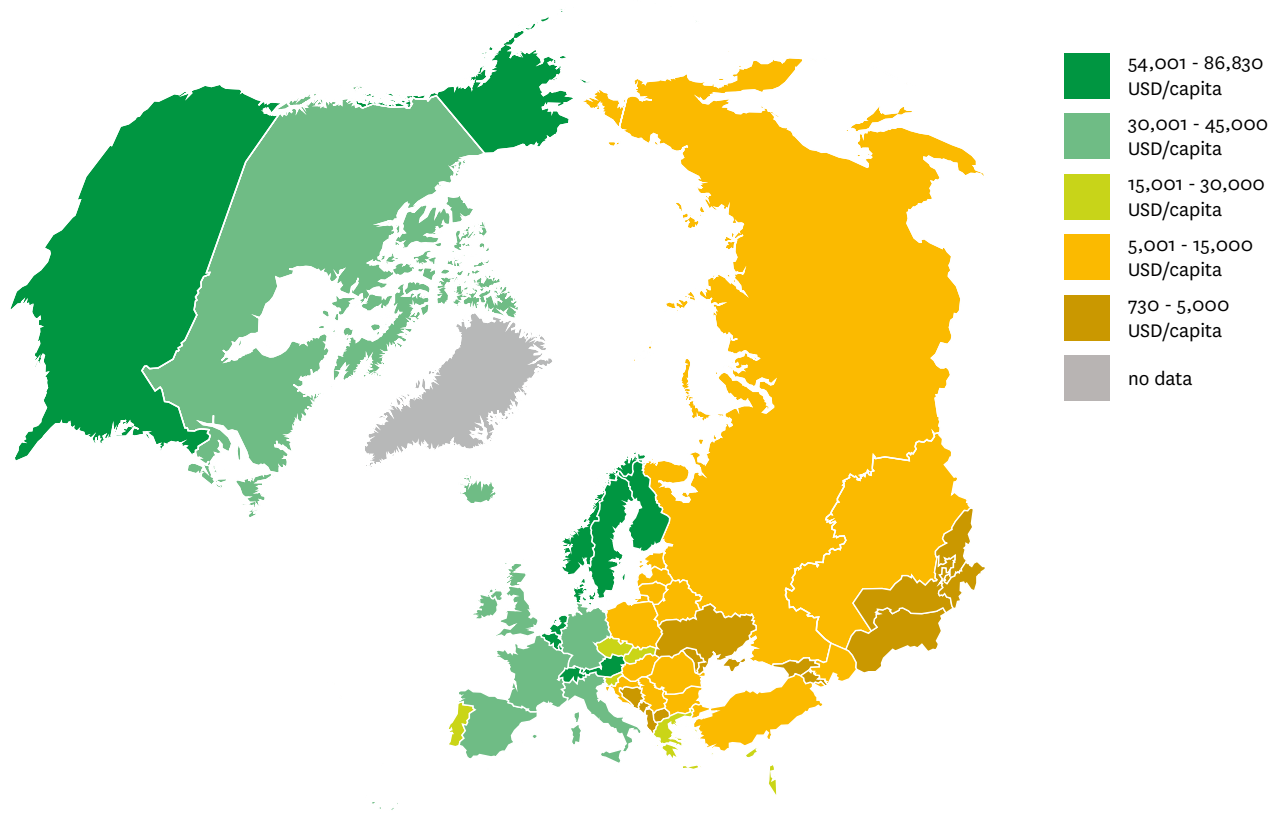


Figure 1.4.5
GDP per capita, 2010
 Source: Annex 3



ECE EAST

This region includes 48% of the ECE Region's forests, mostly in the Russian Federation. These are mostly boreal forests, but there are other forest types. Many of these forests are undisturbed, and extremely remote, with harsh climatic conditions. Fires and insects influence large areas of forest, but in remote areas these may be considered a part of normal ecosystem processes: there is little damage to settlements or infrastructure, which are sparse in these regions, although the associated carbon flows are significant. In addition to the remote boreal forests, there are production forests in the western and southern part of the region.

All four countries in the region were part of the former Soviet Union, and have retained many of its structures with regard to forests, notably the fact that almost all forest land is publicly owned. The average GNP/head is relatively low (\$8,061). There are some strong, export-oriented, forest industries, but downstream processing is not as developed as policy makers would wish. Illegal logging, for domestic use, or for export, is an issue in some countries, especially in remote areas of productive forests. Consumption of forest products is rather low, considering the abundance of the resource. The urban population is 72%, so the rural areas are very sparsely populated.

ECE CENTRAL

The 40 European countries in this group are very diverse ecologically, ranging from boreal to Alpine to semi-desert conditions, and include a few large countries with extensive rural areas, as well as many smaller countries. In general, however, the region is densely populated. There are practically no pure natural forests in the region, and many of the forests are the result of centuries of management in ways determined by the ecological and social conditions in the area. At the national level, forest cover ranges from over 70% to around 10%. In the highly modified landscapes, forests are often one of the few quasi-natural features and have major recreational functions. A few countries in the region have major forest industries, often export oriented, which provide employment and revenue. Elsewhere, forests' major importance in society is for biodiversity, landscape amenities and recreation, although almost all forests in this group of countries are managed with multiple functions in mind. Most countries in ECE Central are quite prosperous, with an average GNP/head of over \$35,000, and a population which is 73% urban. Levels of consumption of forest products are quite high. Nearly 60% of

forests in ECE Central are privately owned, with millions of private forest owners, many with very small holdings.

The relatively low forest cover and the high population density in many parts of the region mean that each inhabitant of ECE Central has less than half a hectare of forest, considerably less than in ECE East and West (4.5 and 2.1 ha/head respectively). As a result, there are sometimes conflicts about priorities between forest owners and users.

All the countries in this region are either members of the EU, aspire to become members or have strong links with it, so decisions taken at the EU level are very influential, even though there is no specific EU forest policy. There is a very complex national and international policy environment, with policy areas such as climate change, energy, rural development and environment interacting strongly with forest policy, at many levels, including EU, national and sub-national (in countries where responsibility for forest policy is at the sub-national level).

ECE SOUTH-EAST

This group includes UNECE countries in central Asia and the Caucasus, as well as Turkey and Israel. Many countries in the group have low forest cover – the average for the group is 11.4%, compared to 42% for the ECE Region. Many of them are also mountainous, sometimes with a harsh climate, which gives the protective function of forests major importance. When deforestation has occurred, over the recent or historical past, the lack of protective functions is keenly felt by societies in this group.

Apart from Turkey and Israel, the countries in this group were part of the former Soviet Union and many of them face challenges arising from the process of transition from a centrally planned economy. As their forest sectors generate relatively little income, and the countries are dependent

on imports of forest products, forest issues are often given low priority in national development strategies; in this respect Turkey is an exception, as it has a long standing forest expansion programme, strong forest institutions, and a substantial wood products sector. The average GNP/head of this group of countries, at just under \$8,000 is about a third of the ECE regional average. Although few reliable statistics exist, it appears that in many of these countries, forests are threatened by erosion and overcutting, often for fuelwood, as well as illegal logging of the few valuable species. Forest dependent people face poverty and even hardship. Most are dependent on imports for their consumption of forest products, although Turkey is a producer of many products that it exports, including to other countries in the region.

ECE WEST

This country group consists of only two countries, Canada and the USA, which are both very large with a vast extent of forests (38% of the ECE Region total). Many of these forests are natural or near-natural, especially in the boreal region, as well as in the mountainous regions at the West of the continent. In both countries, forest disturbances occur, mostly as a result of natural events such as fires and insect outbreaks. Recently there has been a major outbreak of Mountain Pine Beetle in the West of the Continent. Most of Canada's forest land (90%) is owned and managed on behalf of Canadians by provincial and territorial Governments (public land). The provinces and territories use a variety of tenure arrangements to grant rights and responsibilities to companies operating in public forests. The USA has very extensive, publicly owned forests, especially in the west of the country, many of which are managed primarily for biodiversity, recreation and related non-consumptive uses. Elsewhere, private forests are

predominant. Some of these, especially in the US South, benefit from excellent growing conditions and are one of the world's major wood supply regions, and the base for a significant forest industry.

Both countries are advanced economies (average GNP/head over \$48,000), with strong forest industries and trade. The forest sector makes a major contribution to both economies, and provides employment, especially in rural and remote areas. Canada's population is small compared to its land and forest area, and it is a major exporter of forest products, above all to the markets of the USA. In some regions, expanding settlements are putting pressure on surrounding forest areas, causing fragmentation, and exacerbating fire management problems by exposing more people to fire risk. Despite the large forest areas, and remote undisturbed areas with major biodiversity, the populations of both countries are overwhelmingly urban (82%).

1.5 STRUCTURE OF THE STUDY

Chapter 1 has presented the mandate, and process of the study, as well as a brief overview of the salient characteristics of the country groupings used in the study.

Chapter 2, the longest chapter of the study, and the one most focused on data and analysis, presents the main trends for progress towards each global objective, structured around questions which can be answered in an objective and quantified way. It provides overview tables, figures and maps to present the data in an attractive way. It ends with a brief overview of the main conclusions as regards progress of the ECE Region towards the four global objectives.

Chapter 3 presents the main challenges and opportunities facing the forest sector of the ECE Region as regards its progress towards the global objectives. This chapter is based on the description and analysis of chapter 2, as well as the forest sector outlook studies and the Rovaniemi Action Plan for the forest sector in a green economy, which are briefly summarised in this chapter. These challenges and opportunities have been presented to and discussed by government representatives, although responsibility for the study remains with the authors, and the challenges and opportunities have not been formally adopted by any of the sponsoring bodies.





PROGRESS
OF THE ECE REGION
TOWARDS THE
FOUR GLOBAL
OBJECTIVES ON FORESTS

2.1 GLOBAL OBJECTIVE 1:

REVERSE THE LOSS OF FOREST COVER WORLDWIDE THROUGH SUSTAINABLE FOREST MANAGEMENT, INCLUDING PROTECTION, RESTORATION, AFFORESTATION AND REFORESTATION, AND INCREASE EFFORTS TO PREVENT FOREST DEGRADATION

HAS FOREST COVER IN THE ECE REGION EXPANDED OR DECLINED? WHAT HAVE BEEN THE CONTRIBUTIONS OF AFFORESTATION AND REFORESTATION?

The ECE Region as a whole has 1.89 billion ha of forest and other wooded land (Table 2.1.1), 41.4% of the global total, as compared to 34.8% of land area and 18.3% of population. The region's share of the world's forests is one percentage point more than ten years ago: ECE Region forests have expanded while the total of those elsewhere has declined. The average

forest cover in the ECE Region is nearly 42%, higher than the world average, which is 31%.

The region's forests are not evenly distributed: three countries, Russia, Canada and USA account for 1.6 billion ha, 85% of the region's forest and other wooded land.

Table 2.1.1
Situation and trends in area of forest and other wooded land
Source: Annex 3

	Area of forest and other wooded land (million ha)				Change 2000-2015	
	2000	2005	2010	2015	million ha	%
ECE East	900.0	900.9	910.1	909.2	+9.2	+1.01
ECE Central	201.7	203.2	204.9	206.9	+5.2	+2.52
ECE South-East	54.0	54.6	55.8	56.2	+2.2	+3.88
ECE West	707.8	708.6	712.9	719.3	+11.5	+1.60
ECE Region	1,863.6	1,867.4	1,883.6	1,891.6	+28.1	+1.48
EU-28	177.7	179.1	180.3	181.9	+4.2	+2.31

What has been the trend over the past years? Between 2000 and 2015, the region's forest area has expanded by 28 million ha, with increases or stability in every region and every time period. It is possible that some of the "changes" may be due to non-comparability of data over time, but the general trend is clear. In eight countries an increase of more than 10% was reported in area of forest and other wooded land between 2000 and 2015:

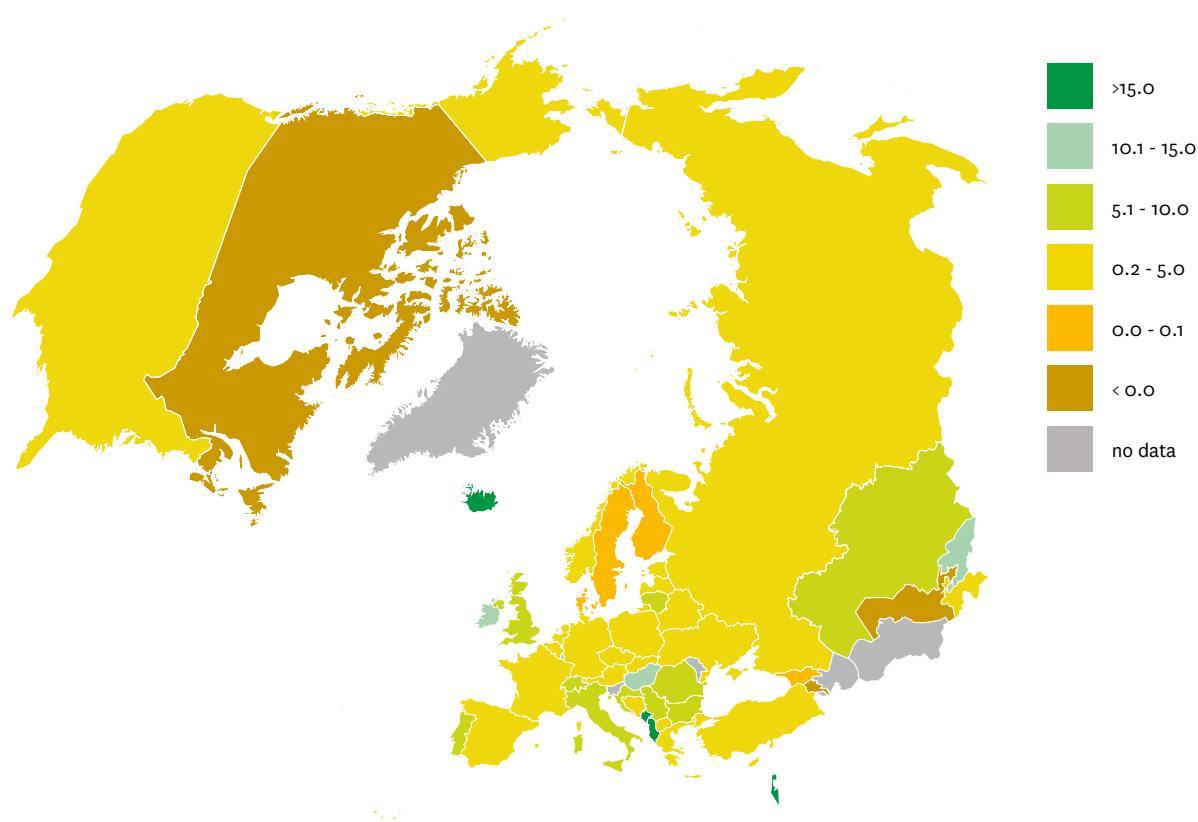
Bulgaria, Hungary, Iceland, Ireland, Israel, Italy, Kyrgyzstan and Montenegro. Two countries⁴ show a drop in area of forest and other wooded land of more than 5% over the 15 year period: Armenia (-12%) and Uzbekistan (-14%). Therefore, it may safely be said that in the great majority of ECE countries, the area of forest and other wooded land has been stable or increasing for at least 15 years, and in most cases, since the 1950s.

⁴ Data supplied for Denmark also show a drop in area of forest and other wooded land, of 9% between 2000 and 2015. However this is due to a new inventory method introduced between 2000 and 2005, making 2000 data not comparable with later figures. Since 2005, the area of forest and other wooded land in Denmark is reported to have increased.

Figure 2.1.1

Change in percentage of forest and other wooded land, 2000-2015

Source: Annex 3



There is in most ECE countries a loss of forest land to other uses, chiefly settlements and infrastructure. In Canada, however, the main causes of loss of forest were agriculture and oil and gas⁵. Comparable data at the international level are not yet available. Figure 2.1.1 shows the net change (extension, minus loss). However, in most cases, this loss is more than counterbalanced by increases elsewhere. Increase in forest area may be due to afforestation (deliberate conversion of non-forest land to forest, notably by the establishment of plantations) or to natural expansion of forest onto non-forest land. Many countries, including several with very large forest areas, are unable to provide reliable data on these trends, but the partial data aggregated in Table 2.1.2 suggest that in the ECE Region, natural expansion is a more important

cause of the recorded increase in forest area than afforestation. Typically, natural expansion occurs when rural land, usually agricultural, is no longer managed for agriculture, and tree formations replace the former uses. Afforestation in the ECE Region, on the other hand, is usually the result of policy instruments, and carried out by state forest organisations, or with the support of public funds, to achieve stated public policy objectives, for instance to increase national wood supply or increase forest cover. ECE countries with plantation establishment policies include Croatia, Ireland, Spain, and UK, although in the latter, the emphasis has changed significantly in recent years. It should also be pointed out that in some cases there may be a problem of measurement or comparability over time, especially in large countries with extensive natural forests.

⁵ State of Canada's Forests 2014.

It is worth pointing out that these trends in forest area are driven by strong forces over which the forest sector itself has little influence, notably rural development, urban settlements, transport and agriculture. If the preference is for compact settlements, there will be less pressure on peri-urban forests than if the preference is for extensive, sprawling settlements. Likewise, when agriculture is prosperous,

there are people and livelihoods in rural areas, and agricultural land has a higher price than forest land. As a result, natural extension of the forest is unlikely. Specific policy instruments may also play an important role: for instance in many countries payments under the EU agricultural policy are conditional on the land being maintained as agricultural land, and farmers are obliged to prevent the natural extension of the forests.

Table 2.1.2
Aggregation of available data on afforestation and natural expansion of forests
Source: Annex 3

	Afforestation			Natural expansion		
	2000	2005	2010	2000	2005	2010
	1000 ha/year					
ECE East	42	43	35	43	58	1,263
ECE Central	215	156	97	277	182	212
ECE South-East	21	54	96	0	3	61
ECE West	187	131	85	122	198	28
ECE Region	465	384	313	441	828	1,776
EU-28	211	153	90	270	165	197

Note: Data missing for many countries. For instance, for 2010, data on natural expansion were only available for 22 countries out of 56.

In the ECE Region, there is much more forest than other wooded land, which typically has lower crown cover and shrub formation, such as Mediterranean maquis, areas near the tree line, or small patches of trees. An exception is Kazakhstan which has five times as much other wooded land as forest and Turkey where the forest and other wooded land cover about the same area.

The forests of the ECE Region are also expanding in terms of stocks of wood.

Growing stock, total and per hectare, has been increasing steadily. Net annual increment (NAI) has risen and is more than the harvest in all countries where this parameter is measured⁶. The ratio of harvest to net annual increment, a simple measure of sustainability of wood supply, is about 20% in ECE East and around 70% in ECE Central (Table 2.1.3 and Figure 2.1.2). No data are available on either parameter for ECE South-East or on increment for ECE West. However, the fellings/NAI ratio should not be interpreted simplistically as

⁶ It was not possible to calculate the NAI/fellings ratio for 22 countries.

meaning that harvests can be increased if the ratio is below 100%. Part of the increase in net annual increment is probably due to improved measurement, and when natural losses and harvesting losses are taken into account, a detailed and site specific exercise, the ratio is not as favourable as the regional totals shown. The age structure of the forest also strongly influences harvest potential. Above all, management objectives, as well as economic and ecological constraints, mean

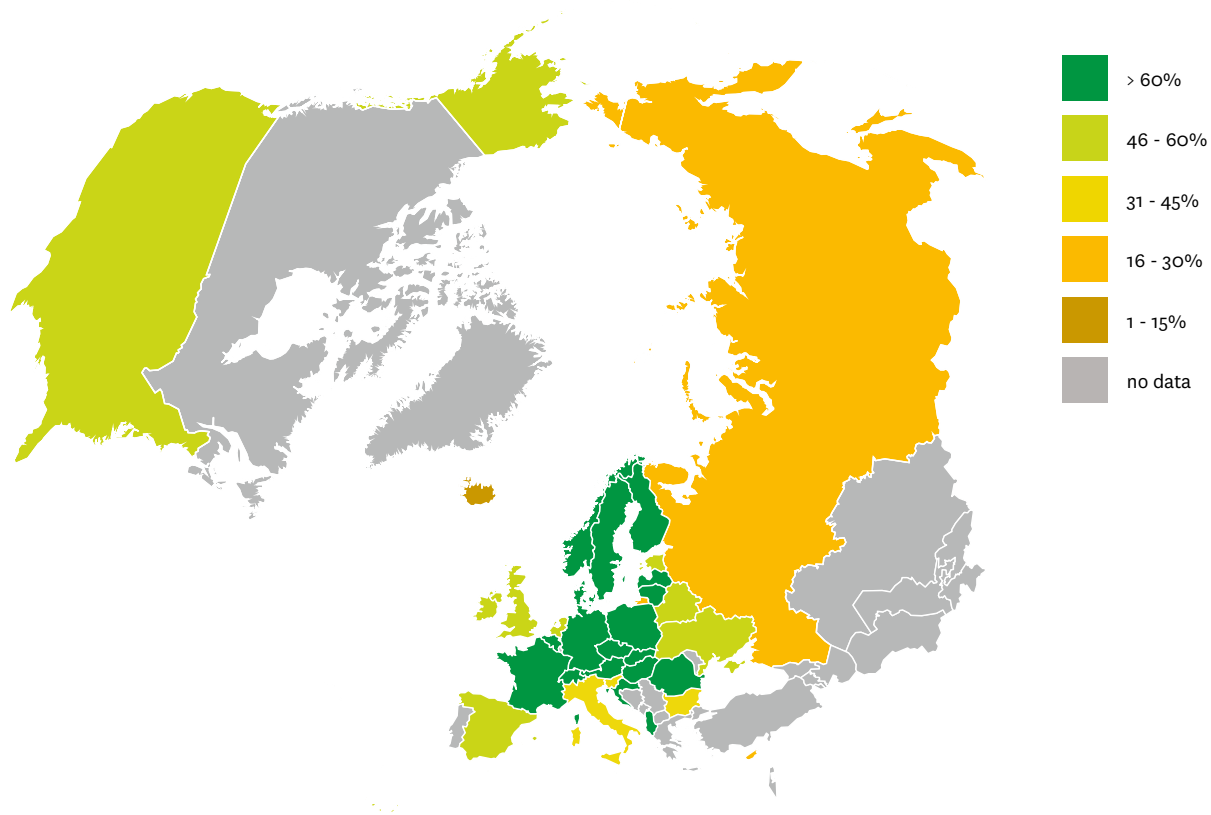
that not all wood growing in the region can, or should, be harvested. Furthermore there is a fundamental difference between areas of natural or near-natural forest where the growing stock has been built up over long periods, and areas of managed forest where the present growing stock is the result of silvicultural decisions. Indeed, at least one country with large areas of natural forest – Canada - does not provide data on annual increment.

Table 2.1.3
Net annual increment and fellings, 2000 and 2010
 Source: Annex 3

	Net annual increment		Fellings		Ratio fellings/NAI	
	million m ³				%	
	2000	2010	2000	2010	2000	2010
ECE East	888	904	185	202	20.9	22.3
ECE Central	768	788	552	577	71.9	73.3
ECE South-East	33	37	n.a.	n.a.	n.a.	n.a.
ECE West	n.a.	n.a.	759	596	n.a.	n.a.
ECE Region	2,577	2,666	1,496	1,375	58.1	57.3
EU-28	727	751	524	546	72.1	72.7

Figure 2.1.2
Ratio of fellings to net annual increment, 2010

Source: Annex 3



In summary, between 2000 and 2015, the region's forest area has expanded by 24 million ha, with increases in every region and every time period, although a few countries report a net loss of forest area. In many countries forest area has been maintained, and in others it is expanding, both through natural extension onto former

agricultural land and afforestation driven by national forest policy. This increase largely outweighs the loss of forests to urban and infrastructure uses. In all countries able to calculate this ratio, fellings are below net annual increment, an indication that wood supply is on a sustainable basis.

WHAT ARE THE MAJOR BIOMASS AND CARBON STOCKS AND FLOWS CONNECTED TO FORESTS OF THE ECE REGION, AND HOW HAS THE ROLE OF FOREST MANAGEMENT INFLUENCED THESE TRENDS?

CARBON STOCKS

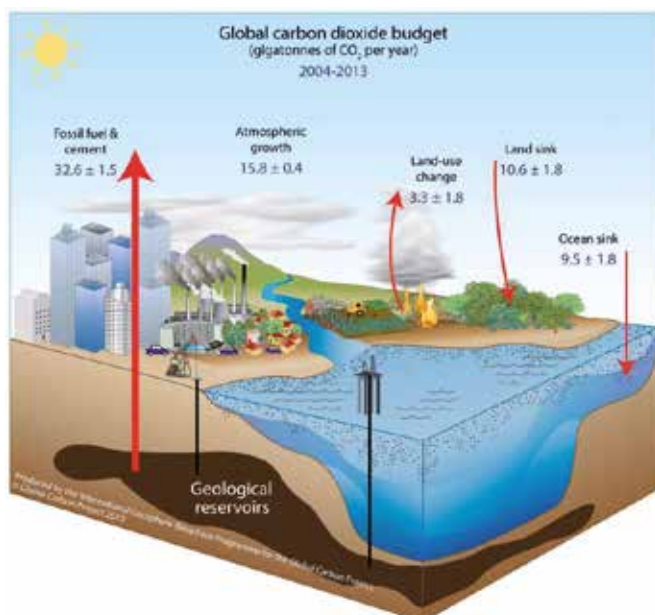
The stocks of carbon in forests worldwide are enormous (Pan et al., 2011) and forests play a key role in the global carbon budget and in mitigating climate change (IPCC 2013). The IPCC conclusion from the fourth IPCC Assessment Report (4AR) stated: 'In the long term, a sustainable forest management strategy aimed at maintaining or increasing forest carbon stocks, while producing an annual sustained yield of timber, fibre or energy from the forest, will generate the largest sustained mitigation benefit'. This is still valid and was confirmed in the fifth report (AR5) (IPCC 2007, 2014).

The carbon stock of forests is increasing continuously, mostly thanks to forest developments in the Northern Hemisphere. In contrast, forest degradation, damage and clearance, lead to carbon emissions, with global deforestation being a major contributing factor to the net increase in atmospheric CO₂. The emissions from deforestation are roughly 10% of the total emissions of carbon from fossil fuel. In contrast, the total net global forest sink (growth minus emissions from losses) accounts for 30% of the total fossil fuels emissions (Le Quere et al. 2013), see Figure 2.1.3.

Figure 2.1.3

Forest sink in relation to emissions from fossil fuel

Source: Le Quere, 2013



Note: The carbon stock in global forests biomass and soils amounts to some 800 Gt C, roughly 100 times the annual emissions from fossil fuel

Most of the land sink is occurring in forests whereby the role of tropical forests and their natural dynamics is increasingly recognised. Still, to a large extent this forest biomass sink is occurring in Northern Hemisphere forests, most of which are in the ECE Region, due to natural dynamics, regrowth and probably responses to increased CO₂ in the atmosphere and increasing temperatures. Geographically it remains unclear where precisely this sink occurs.

These data from Le Quere (2013) are derived from the general scientific consensus on carbon stocks and flows, based on remote sensing, inverse modelling, residual sink estimates and presented by the IPCC. However, the data from FRA, ultimately based on traditional national forest inventory methods, give a rather different picture: the large gap between the land sink data of the climate change community and the northern forest sink according to data reported to FRA presents a major challenge.

Forests of the ECE Region play an important role in climate regulation because of their vast area, through direct physical absorption of radiation and through water

evaporation, but also through sequestering and storing carbon in the living biomass, soils, and in wood products. Vast areas of the ECE land area are covered by forests, from Mediterranean through temperate to boreal forests; it is this great variety of forest types, and the variety of cultural historical management that determines the present and future carbon sequestration options.

The total amount of carbon in aboveground living biomass in the ECE countries amounts to 63 Gt of carbon according to FRA, of which 40% in Russian forests, 18% in Canada, and 23% is in the USA (Figures 2.1.4 and 2.1.5). The amount in the soils could be up to 8 times these amounts mainly because of large carbon stocks in boreal peats and permafrost. In addition, harvested wood products hold the carbon during their lifetime. S. Ruter (personal communication) estimated the total stock of carbon in harvested wood products in the ECE Region at 5 Gt C. This would mean some 7% of the carbon in living biomass. This seems high for the ECE Region as large tracts are not managed, which would result in a very low ratio. Others estimated this ratio also at 6%, but that was for the managed forests of Europe.

Figure 2.1.4
Total carbon stock in aboveground living biomass for all ECE member States by the four groups

Source: Annex 3

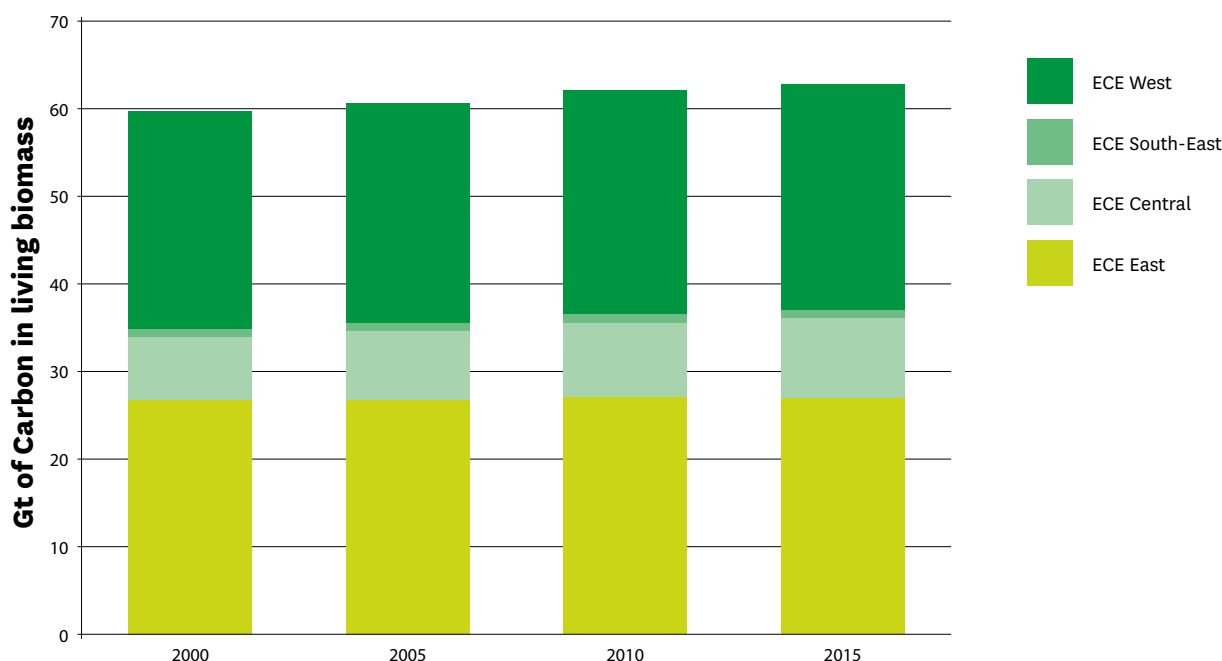
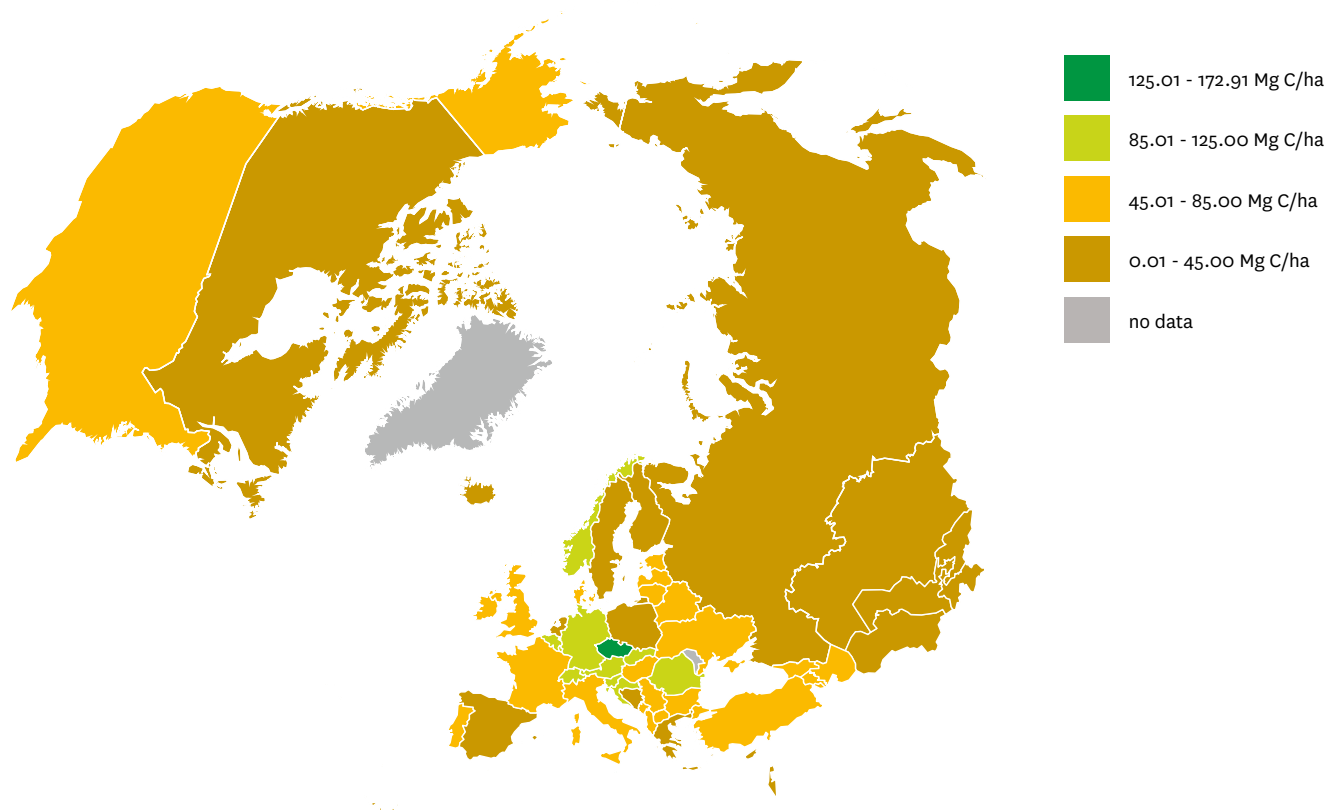


Figure 2.1.5

Carbon stock in living biomass per hectare of forest and other wooded land, 2015

Source: Annex 3



CURRENT CARBON SINK⁷

The total living biomass carbon sink in ECE forests amounts to 255 Mt carbon/ year between 2005 and 2010 (FRA 2000, 2005, 2010). However, reporting to UNFCCC by the same set of countries reveals a living biomass carbon sink of 573 Mt carbon/ year in 2012 (unfccc.int). This shows the still large uncertainty that surrounds these numbers.

Although the size of the sink is uncertain, it is characteristic of the Northern Hemisphere forests that the sink is substantial, and continuing. This is due to the fact that across these countries large areas are recovering from earlier deforestation (Europe, USA, western part of Russia). In addition, it is most likely that

the remaining primary forests are building up carbon stocks because of better growing conditions in recent times.

The Russian sink is very large, although highly uncertain as the per hectare sink is very small; it accounted for 25% of the total increases to the sink of the region in 2005-2010, but only 5% between 2000 and 2005. Large differences between countries also occur; Canada reports to FRA a net loss of 24 Mt carbon per year between 2005 and 2010. The very large and highly variable natural disturbances in some regions of Canada (Mountain Pine Beetle, fires) outweigh the carbon increment in large tracts of forests in other regions. The USA, with a large estate of regrowing forests, displays a total sink of 112 Mt Carbon/y between 2005 and 2010.

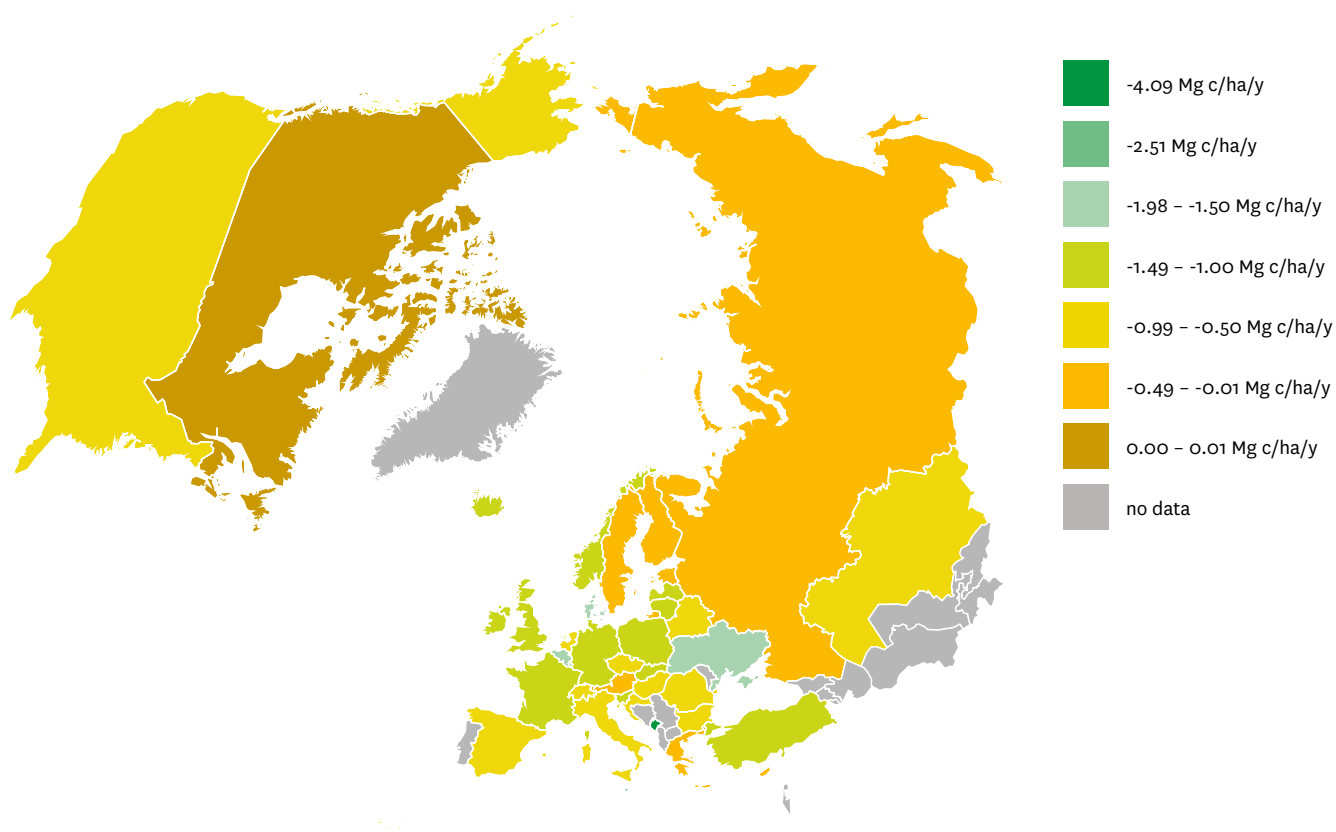
⁷ A carbon “sink” is an ecosystem (or part of an ecosystem wood chain) which takes more carbon from the atmosphere than it releases. A “source” is then the opposite. Also “Any process, activity or mechanism which removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas or aerosol from the atmosphere”

In Figures 2.1.6 and 2.1.7 it can be seen that ECE Central plays a relatively large role in the annual sink (40% of total ECE sink); this is much larger than what might be

expected based on forest area or carbon stocks, and is caused by the significant difference between increment and fellings in this region.

Figure 2.1.6
Per hectare annual carbon sink or source in living forest biomass in the countries of the ECE Region, 2012

Source: based on country submissions to UNFCCC



Note: negative number denotes a sink

Figure 2.1.7

The annual sink (Mt C/y) in forest biomass by country groups over two time periods

Source: Annex 3



Note: Sink calculated from the difference in stock between periods

Also in ECE Central the FRA data show large differences between countries in per hectare carbon sink. Some difference can be explained by logging intensity or growth rate, but data tend to fluctuate widely from period to period. European forests have been expanding in area and growing stock (it is estimated since 1800) after centuries of degradation and interrupted by periods of war, notably the second world war which caused huge damage to forests. Since the 1950s, large investments have been made to establish new forests. This is now resulting in a forest estate with increasing growing stock, and due to increased net increments (almost double the harvest), a net sink has occurred from the 1970s until now. However, data show that the forests of Europe are reaching their maximum stocking levels and maturity, growth rates may be slowing in western-central Europe

and as a result, the carbon sink is not increasing (Nabuurs et al. 2013).

Although the net forest area is increasing in the ECE Region (see section 2.1.1), gross deforestation still occurs. In terms of area, gross deforestation (e.g. through urban sprawl) is less than expansion, but in terms of carbon, the loss can be significant because all of the carbon in those areas is lost rapidly, while forests take a long time to regain the same amount of carbon. This type of degradation is going on in several regions. For instance, in drought-prone regions, degradation occurs, whose size is often unknown. However, at the national level, in all countries, the growing stock has been increasing, as widespread increases in forest area and increment outweigh the loss of growing stock due to forest loss or harvest.

OVERVIEW OF PROGRESS IN THE ECE REGION AS REGARDS FOREST BIOMASS STOCKS AND FLOWS

The ECE forests cover much of the northern Hemisphere, and are dominated by three countries: Canada, Russia, and USA. The ECE forests are a significant carbon sink which continues to grow, but which is also surrounded by uncertainty over its size and its underlying causes. The impacts of natural dynamics and growth responses to enhanced CO₂ versus impacts of forest management are unknown. Compounding this, countries report large differences from time to time, which cannot always be explained. Much needs to be done in improving monitoring and reporting.

The climate benefits from a large sink in the forests of the ECE Region. This is mostly due to regrowth, and natural dynamics, but these are themselves only possible because of the measures taken over the years to protect and manage on a sustainable basis the forests of the region. However, the potential to increase the sink by silvicultural measures is limited. The optimism which surrounded the Kyoto Protocol discussions, and the general belief at that time that forest management at the global scale could significantly increase the carbon sink, has not been confirmed by events. Our understanding has grown and studies have concentrated increasingly on the full chain, including substitution and adaptation, but in practice not much has changed. Afforestation projects for carbon sequestration have proven difficult to implement.

The size of the carbon sink in ECE forests seems difficult to control and is prone to risk of unintended carbon emissions through fire, insects, wind, etc. These disturbances and ageing forests are indications that at some point the sink will saturate. We do not know how much longer we can benefit from the carbon sink in the forests of the ECE Region (Lindner et al. 2014).

There are many discussions about the degree to which carbon sequestration can be enhanced, emissions reduced and the strategies that would be needed to achieve this. There is also greater understanding that assumptions about the carbon neutrality of biomass for bioenergy are problematic from a carbon accounting perspective: delays between emissions from burning wood, and the regrowth time - even if it is only a few decades-, count in the international carbon accounting. Furthermore, the complexity of the policy environment and the interactions between policy instruments are highlighted, and some unintended consequences have emerged. For instance, encouraging the supply and use of renewable energies, including wood, has led to concerns about biodiversity conservation, the sustainability of wood energy imports and availability of raw material for panel industries.

WHAT IS THE AREA OF SUSTAINABLY MANAGED FOREST IN THE ECE REGION, AND WHAT ARE THE TRENDS?

Based on the existing information there are three approaches to measuring trends in the area of sustainably managed forest in the ECE Region: (i) area under forest management plans (FMPs), (ii) area of certified sustainably managed forests, and (iii) measurement of progress based on participation in the regional Criteria & Indicators (C&I) processes. The first two options are based on measurement on the level of forest management units. The third option listed is applicable at the national level. All three options are linked with each other. Elaboration of forest management plans is usually part of the forest certification standards as one element of sustainability. In the case of certified forest area, the records on the coverage of valid certificates are kept by the two international certification schemes (FSC and PEFC). In these forests, the assessment has been made against

certification standards which address all three pillars of sustainability (economic, social and environmental). The C&I approach, which is also holistic, covering the same three pillars, relies on national reports on progress made towards SFM. None of the approaches by itself is an objective measure of sustainable forest management, but taken together they provide strong indications of the situation and trends.

AREA UNDER FOREST MANAGEMENT PLANS

Data on area under FMPs by country exist in the Forest Resources Assessment and pan-European reporting processes.

About 80 percent of the ECE forests are under forest management plans or equivalent and there has been only a marginal increase in the area (Table 2.1.4). The highest coverage is in ECE East where all the forests are reported to be under such plans. In ECE Central and West only about two thirds are managed under formal plans or their equivalent. In both regions the area has increased by 0.5-1.5 million ha in 2005-2010. In ECE South-East the share is 57 per cent but the area increased by about 0.6 million ha in 2005-2010. The type of forest management plan varies widely from formal, detailed, legally approved plans to informal arrangements guiding forest owners' decisions.

Table 2.1.4

Area under forest management plans 2000-2010

Source: Annex 3

	Forest with management plan or equivalent (million ha)			Forest (million ha)	Share of total forest area in 2010 (%)
	2000	2005	2010		
ECE East	827.1	826.8	827.3	833.6	99
ECE Central	116.4	117.6	118.1	181.8	65
ECE South-East	17.1	17.7	18.3	28.2	57
ECE West	401.8	406.9	408.4	657.2	62
ECE Region	1,362.3	1,369.1	1,372.0	1,700.8	81
EU-28	109.3	109.8	110.7	160.9	81

AREA OF CERTIFIED SUSTAINABLY MANAGED FORESTS

The area of certified sustainably managed forests was 383 million ha of which more than half is in the two North American countries, 28 per cent in ECE Central and the rest in the CIS⁸ (Table 2.1.5; Figure 2.1.8). The ECE Region accounted for 88 per cent of the global certified forest area in 2014.

During the seven-year period between 2007 and 2014, the certified area in the ECE Region expanded by more than 50% and the growth has been fastest in the CIS followed by ECE Central and ECE West. However, in absolute terms the certified area grew most in North America (144 million ha) followed by CIS (36 million ha) and ECE Central (24 million ha) (Figure 2.1.8).

The certified forests in the ECE Region occupy almost a quarter of the total forest area⁹ (Figure 2.1.5). The share is two and a half times higher than the global average (11 per cent). The highest share is found in ECE Central (about 60 per cent) followed by ECE West (about 33 per cent). In the CIS only seven per cent of the forest area has been certified.

There are significant differences among countries with respect to the share of certified forests. The highest levels are reported in Belarus, Finland, Norway, Estonia and Poland and the lowest in Russia, Bulgaria, Italy, Portugal, Spain and USA.

In 2014 national schemes endorsed by the Programme for Endorsement of Forest

Certification (PEFC) account for 67 per cent of the total certified forest area in the ECE Region. Certifications under the Forest Stewardship Council (FSC) which is an integrated international scheme covered the remaining 33 per cent.¹⁰ The appendix contains the data on the certified area of each scheme in the ECE Region by country in 2014.

For market reasons, some large forest organizations have certified their forests under both schemes to enable their clients to meet the minimum certified fibre content requirements of either scheme and thereby allow respective labelling of their end products. Such double certifications cover an estimated 7.5 million ha, practically all in the ECE Region, about 2% of the total certified area.¹¹ On this basis, the area of certified forest in the ECE Region may be estimated at about 383 million ha.

While there is still a long way to go to expand the use of forest certification as a market-based tool to promote SFM implementation in the ECE Region, it needs to be emphasized that non-certified forests are not necessarily managed unsustainably. For instance, protected areas do not produce timber for the market and therefore there is no need to apply for their certification. In addition, other tools than certification may also be used to promote sustainable forest management, including voluntary best management practices, environmental protection laws, training programmes and fiscal incentives. However, some large protected areas have been certified to demonstrate the quality of their management and to ensure the maintenance of their environmental and social values. There will always be forest

⁸ Commonwealth of Independent States, which is ECE East and ECE South East, without Turkey and Israel. The data provided by the FPAMR refer to CIS, and it has not been possible to disaggregate them according to the regions used in this study.

⁹ A similar comparison could be made also against the forest area available for production. However, the certified area includes also protected area in some countries and therefore, a detailed analysis would be required to remove them from the data to estimate potential supply from forests available for production.

¹⁰ Calculated based on the FSC and PEFC websites consulted on 20 August, 2014.

¹¹ UNECE/FAO Forest Products Market Review 2013-2014.

owners who will not seek certification, because they do not need it or cannot afford it. This includes forests with very extensive or passive management, very small holdings, absentee owners, those who focus on recreation or biodiversity etc.

The regional differences are influenced by several factors including designated use of forests, the ownership structure, the average size of forest management units, market requirements, accessibility, available financing, and organization of forest owners.

Table 2.1.5

Area of certified sustainably managed forests in the ECE Region, 2007-2014

Sources: UNECE/FAO Forest Products Annual Market Review 2008-2009 for 2007;

UNECE/FAO Forest Products Annual Market Review 2013-2014 for 2014

	Million ha		Change (%)	Share in 2014 (%)	Certified share of total forest area in 2014 (%)
	2007	2014			
ECE West	146.2	216.7	48.2	56.6	33.0
ECE Central	85.9	110.3	28.4	28.8	60.6
CIS	19.4	55.7	187.1	14.6	6.5
Total	251.5	382.7	52.2	100.0	22.5

Figure 2.1.8 a
Share of PEFC certified forests
Source: Annex 3

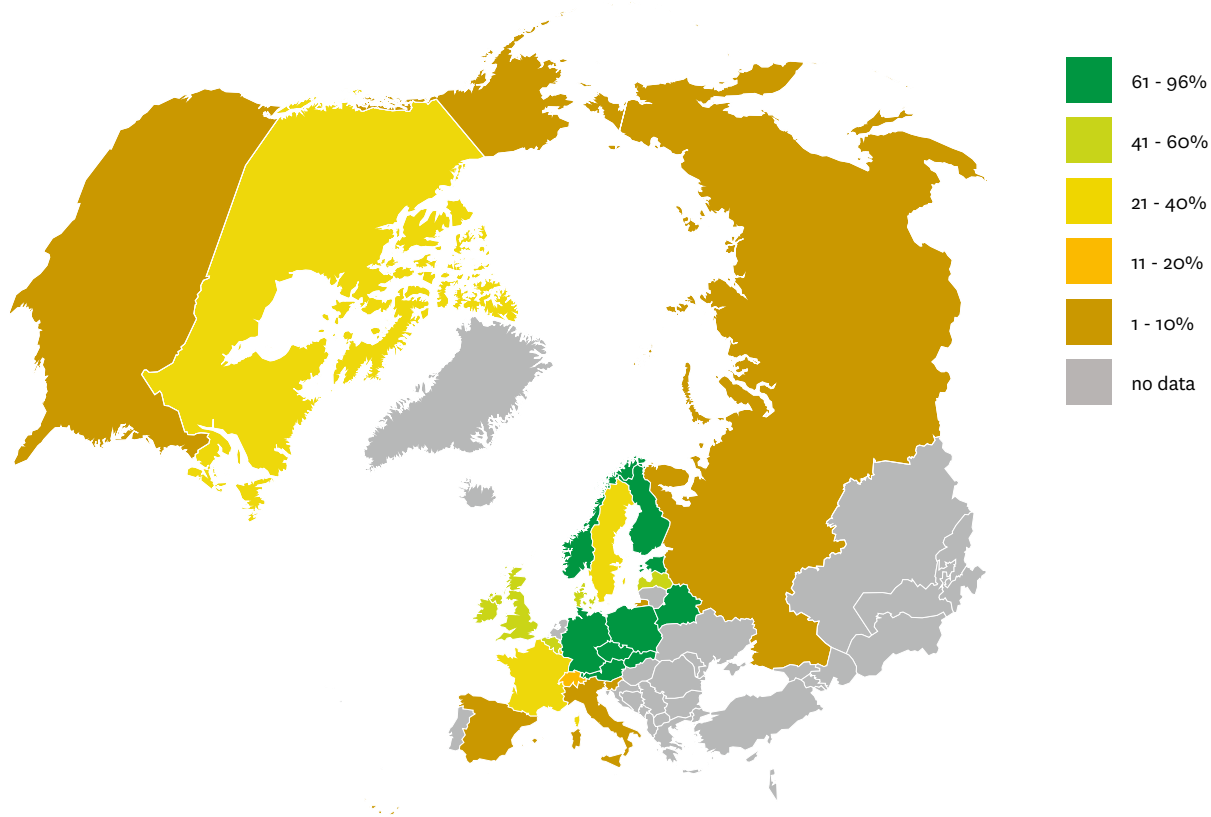
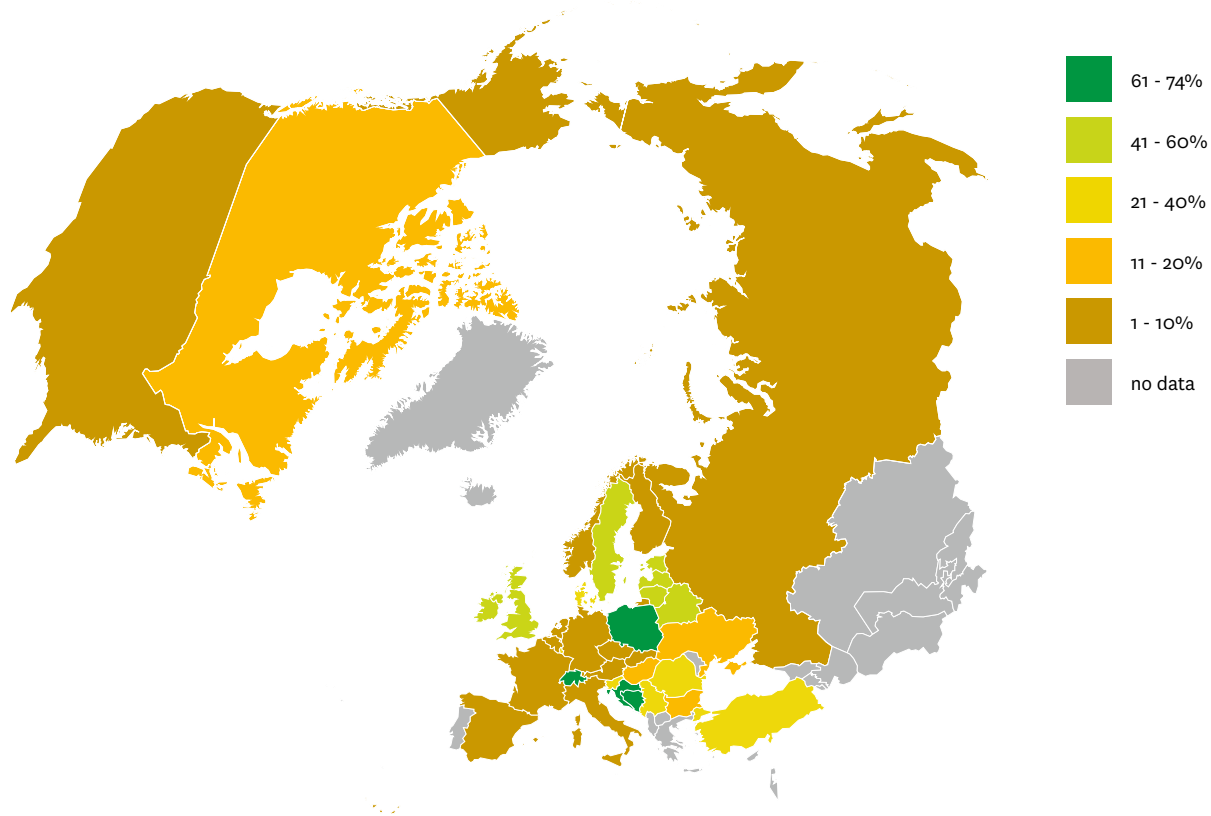


Figure 2.1.8 b
Share of FSC certified forests
Source: Annex 3



In ECE West the average area covered by a certificate is almost 600,000 ha and in the CIS 330,000 ha. In these two regions large-scale forestry is commonly carried out by state forest agencies, forest industry corporations, and recently by timberland management organizations. In ECE Central, where private family forest ownership is common in many countries, the average area covered by a certificate is 2700 ha.¹² Small-scale forest management units have often been certified through grouping them under associations, cooperatives or other arrangements in order to seek economies of scale to cover the auditing and other costs due to the certification process. Engaging family forest owners in forest certification has been a challenge, as in many countries they are lacking organization and resources, which limits progress in demonstrating SFM.

There are historical and national reasons for the choice between the two international systems; FSC has more large-scale forest management units and the

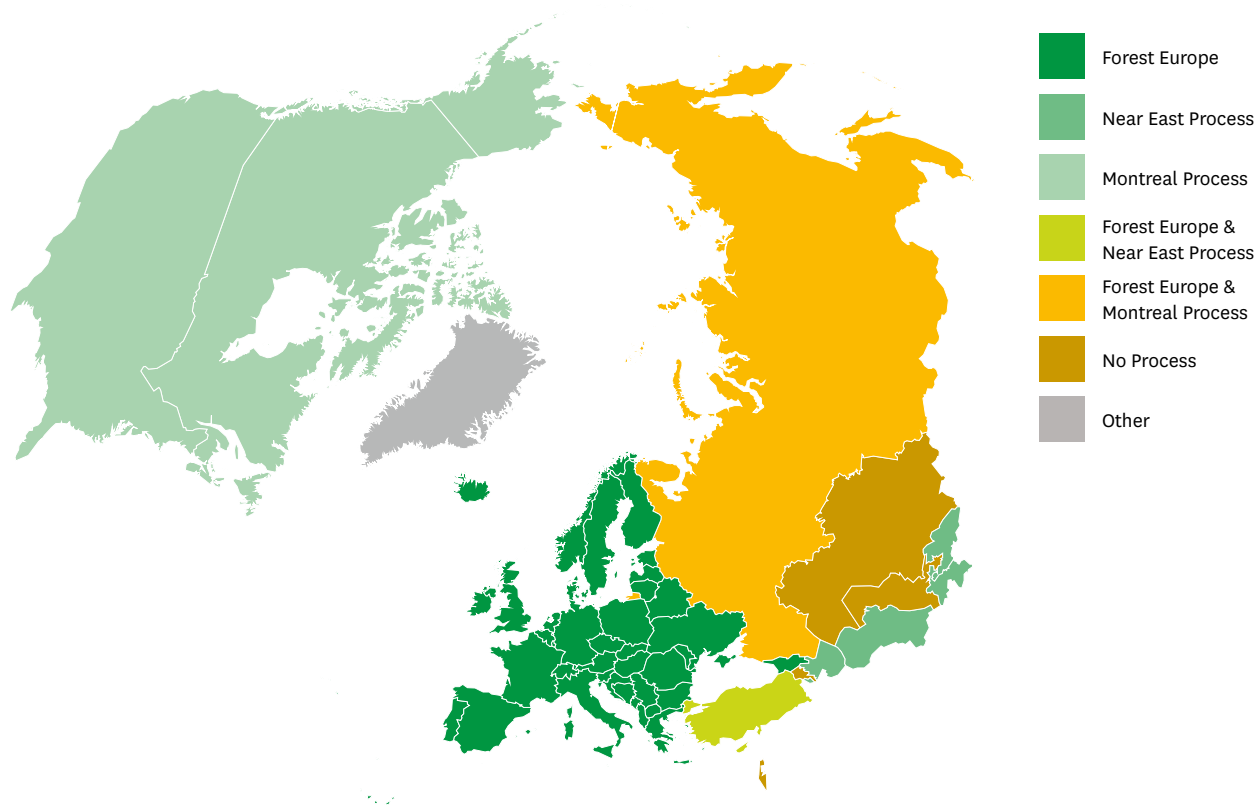
average area covered by their certificate in the ECE Region is 184 000 ha while the national schemes endorsed by PEFC tend to be small-scale family owners and their organizations. The average area of a PEFC certificate is only 5 600 ha (PEFC, 2014). However, both schemes are open for certification of all sizes and types of forest holdings.

PROGRESS TOWARDS SUSTAINABLE FOREST MANAGEMENT BASED ON CRITERIA AND INDICATORS

Almost all ECE member countries are members of one or more regional processes of criteria and indicators of sustainable forest management. Notably, in the ECE Region there are three processes: the Montréal Process, FOREST EUROPE and the Near East process (Figure 2.1.9). These processes, and the sets of criteria and indicators which they have produced, have many uses, such as providing a framework for dialogue, policy making and information collection and analysis, as well as assessing the sustainability of forest management.

¹² Calculated based on the FSC and PEFC websites consulted August 20, 2014.

Figure 2.1.9
Processes on SFM Criteria and Indicators in the UNECE Region



The Montréal Process criteria and indicators were most recently revised in 2009. According to the working group document presenting the revision, “Together, the Montréal Process criteria and indicators provide a common framework for member countries to monitor, assess and report on trends in forest conditions with respect to the full range of forest values and, in turn, on national progress toward sustainable forest management. They represent a holistic approach to forest management. The seven Montréal Process criteria characterise the essential components of sustainable forest management. The 54 indicators provide a way to measure those essential components. No single criterion or indicator alone is an indication of sustainability. While the C&I are not performance standards, they provide

useful information for forest policy makers. A number of countries also see criteria and indicators as providing a useful framework for developing sub-national policies, management plans, and inventories.”

The Forest Europe criteria and indicators were first approved in 1998, and later revised in 2003. They provided the foundation for the Pan-European Operational Level Guidelines for sustainable forest management on which a major forest certification system, PEFC, is based. They have found many uses at the national and subnational level, and been the basis of reporting on the state of Europe’s forests to three ministerial conferences. They are presently being considered for revision. An academic study carried out by the European Forest Institute

(EFI, 2013) on the implementation of the pan-European set of criteria and indicators proposed objectives as follows:

The objectives of the pan-European criteria and indicator set, or a national set derived from it, and specifically the information structured according to it, are to carry out one or more of the following functions:

1. *Provide a framework for dialogue and communication on sustainable forest management and forest policy development between policy makers (inside and outside the forest sector), relevant stakeholders, and society as a whole.*
2. *Monitor and report on the state and trends of the forest sector and on the implementation of national commitments with regard to sustainable forest management.*
3. *Provide structured information and analysis making it possible to assess progress towards the goal of sustainable forest management, and on that basis to identify emerging issues and areas of concern.*
4. *Provide tools for use by those who formulate, implement, monitor and evaluate national or sub-national forest programmes, policies and/or plans, laws and improve forest sector governance.*
5. *Provide a structure and conceptual framework for research into sustainable forest management.*
6. *Provide information and/or assessment for analysis to other sectors and initiatives which are relevant to the forest sector, and provide input for cooperation with forest sector processes and policies in other regions (EFI 2013)*

It is apparent from the above statements that criteria and indicator sets are important tools for sustainable forest management at several different levels, but that they are complex and multi-functional and so cannot simply be “applied” or “implemented” to achieve sustainable forest management, or indeed to measure progress towards it, in the way which would be needed to measure progress towards Global Objective1. The EFI project also determined that many countries in the pan-European region explicitly base their forest legislation and policy statements on sustainable forest management principles as articulated in international instruments, such as the resolutions of Ministerial Conferences and the declarations of UNFF.

However, methods are being developed to use these criteria and indicator sets to assess the sustainability of forest management at the national level. A pilot implementation of the ECE/FAO method for the evaluation of the management of forests (SEMAFOR) will be carried out in 2015. It will use a subset of the pan-European indicators, with agreed threshold values, to identify areas of concern and action taken to address them.

In summary, the widespread use of the Montréal Process and pan-European criteria and indicators sets is in itself an indication of high level policy concern for sustainable forest management.

ASSESSMENT OF PROGRESS IN THE ECE REGION WITH REGARD TO SUSTAINABLY MANAGED FORESTS

Based on the data on certified forests, it can be concluded that the ECE Region as a whole has made significant progress in demonstrating that areas under SFM have increased substantially. Two thirds of forests in ECE Central are already certified and about one third in ECE West. In spite of the recent fast growth in ECE East, due

to the extensive forest area in Russia and lack of certified forests in ECE South-East (with the exception of Turkey), only a small certified share is achieved in these regions. Therefore, there is still a long way to go until sustainable management in the entire region's production forests can be demonstrated through SFM certification. In most, cases, achieving certification demonstrates sustainability which existed before, so an increase in certified forest does not imply an increase of sustainably managed forest.

The key issues in expansion of SFM areas are enabling political conditions for necessary investment and effective management, financial support to countries lacking human and other resources, engaging small-scale family forest owners in forest certification, and maintaining the credibility of SFM and its certification.

There are several parallel regulatory and other initiatives to monitor and verify the outcomes of forest management in the ECE Region which also have implications for SFM certification. Legality of forest production needs to be specifically demonstrated to meet the requirements of the EU Timber Regulation. Similarly, for the 2008 amendment to the Lacey Act in the USA, importers are required to practice 'due care' in their imports, and the legality of imported wood fibre must be affirmed by the importer. The two international certification schemes have taken measures to make adjustments to address this issue. Another area to consider is the possible complementary role of SFM certification in implementing REDD-plus for verifying sustainability in forests managed for carbon sinks. The planned EU regulation

on sustainability of solid biomass energy sources could also partly rely on the existing SFM certification. Finally, the differences which remain between the two international certification schemes – often of minor substantive significance – remain an issue to be addressed to facilitate faster demonstrated progress in SFM in the ECE Region.

Another proxy for movement towards sustainable forest management is active participation in processes to define and implement criteria and indicators of sustainable forest management. Most countries in the ECE Region are members of either FOREST EUROPE or the Montréal Process, or both. This is evidence of formal commitment by ECE governments to sustainable forest management, public monitoring of progress towards this goal and good governance of the forest sector.

Forest management planning is an essential element of the SFM implementation process but it is not a legal requirement in many ECE countries in which small-scale family forest ownership is dominant. In such cases, a forest management plan is understood as a valuable tool for "business planning" of forest activities, which duly considers the three sustainability pillars; but it is left for the owner to set objectives for how to achieve the sustainability requirements defined in the national legislation or the applicable SFM certification standard. The area under forest management plans is a useful partial indicator for assessing progress towards SFM but needs to be complemented by holistic measures such as criteria and indicators or certification.

HOW MUCH FOREST DEGRADATION IS TAKING PLACE IN THE ECE REGION, AND WHAT PROTECTION AND RESTORATION MEASURES ARE BEING UNDERTAKEN?

In the discussion of tropical deforestation, “forest degradation” typically refers to a situation where the quality of a forest has been reduced, often by human intervention, including logging, but total deforestation has not taken place; large valuable trees have been removed, canopy cover has been broken to a large extent, the species mix has been disturbed, erosion and other negative processes have started, fragmentation has increased, etc. However there are many other types of degradation which may occur when a forest’s quality has been reduced without deforestation taking place. Forest damage due to insects, fire or disease may lead to forest degradation, as may other negative trends, which are discussed below.

In practice, it is hard to define or measure “forest degradation”, notably because of ambiguity as regards the definition of “quality”; does this refer to biodiversity, ecosystem processes, growing stock or benefits supplied to local populations or something else? FRA 2015 will use an approach based on “partial canopy cover reduction that does not meet the definition of deforestation, or nearly complete canopy cover removal”. At present, however, no data using this concept are available for the ECE Region. It also appears that linking a significant reduction in a forest’s quality – however defined – to a single parameter (crown cover), while convenient from the inventory point of view, is too reductive a concept.

Another problem in measuring forest degradation arises from possible confusion

between “degradation” (measured by loss of canopy) and certain silvicultural methods widely applied in the ECE Region, which are generally considered desirable and sustainable, but share some features with “degradation”:

- Harvesting based on clear cutting reduces growing stock at the end of the rotation, as preparation for the next rotation, while the forestry land use is maintained. This action mimics certain natural stand renewal processes, notably fire.
- Thinning also reduces growing stock per hectare to improve the quality of the remaining stems.
- Establishment of plantations, with high increment but relatively low growing stock/hectare, very limited number of species and lower biodiversity, in the place of natural or semi-natural forests, is considered by some to show some features of “degradation”.

Although there is no quantified information on the area of degraded forest in the ECE Region, some indicators are available, using trends for growing stock.

One common feature of forest degradation, as it is often understood, is a strong reduction in growing stock per hectare on the affected area. The data in Table 2.1.6 indicate clearly that in all parts of the region, the average growing stock per hectare has been rising, as harvests remain well below increment. This statistical trend does not exclude the possibility of falls in growing stock per hectare in some forests (compensated by increases elsewhere), but it does indicate that they are not widespread.

Table 2.1.6
Growing stock per hectare in the ECE Region

Source: Annex 3

	Growing stock per hectare (m ³)			
	2000	2005	2010	2015
ECE East	101.0	101.5	102.3	102.4
ECE Central	137.3	145.0	152.3	160.0
ECE South-East	82.7	84.6	88.2	91.5
ECE West	120.2	126.5	129.8	133.9
ECE Region	111.9	115.5	118.0	120.5
EU-28	141.8	149.4	156.4	164.4

However, it is clear that all over the ECE Region, there are forests which have lost some of their quality, or the ability to perform all their functions. These types of degradation are briefly listed below, with quantitative information when possible, and the measures taken to remedy or minimise this degradation.

About 6-7 million ha (6.3 million in 2005 and 7.3 million in 2010) of forest and other wooded land are damaged by fire every year in the ECE Region. Some of these fires, notably in the remote areas of ECE East and West, may be considered part of natural ecological processes, but many fires cause significant damage, especially to settlements and managed forests. Growing stock is lost, carbon is released to the atmosphere, amenity value is reduced, and there is often damage to settlements and infrastructure, and above all, to human life, notably fire-fighters. Very large costs are incurred for fire management, for instance about half of the budget of the US Forest Service.

Over 30 million ha were recorded as damaged by insects and disease in 2005, although there are many problems of data gaps and double counting¹³. In a few cases, such as the Mountain Pine Beetle in western regions of Canada and USA, trees have been killed over very wide areas¹⁴ (Natural Resources Canada, 2005). Elsewhere, infestations are smaller, or attack only certain species. Mature elm has disappeared in many parts of western Europe, and ash is now threatened by the ash borer. Large amounts of carbon are released, amenity values and growing stock are hurt, and ecosystems modified.

Weather events causing forest damage (storms, ice, avalanche, precipitation) have always existed, but the frequency of catastrophic events seems to be increasing (Gardiner, et al., 2013), causing significant ecological and financial losses, as well as market disruption, and extra public expenditure to respond to the events. Major storms hit Europe in 1990, 1999 and 2007. In the areas affected,

¹³ For instance, areas affected by two species of insect are usually counted under both species. Also, a certain degree of insect infestation is part of normal ecosystem processes, especially in natural forest areas.

¹⁴ Over 18 million ha in British Columbia alone, with a cumulative impact of 752 million m³ of wood.

forests bear the scars for many decades, and forest owners suffer significant losses.

The expansion of urban areas into the surrounding rural areas all over the region is a major factor of fragmentation of forest landscapes, with consequences for biodiversity and amenity. In North America, where a decline in forest area is projected by official outlook studies and the North American Forest Sector Outlook Study (NAFSOS), most of the projected decline in forest area would occur as a result of urban expansion to accommodate population growth in the USA. These losses of forest area would be concentrated in the south-eastern US, in areas where populations are rising rapidly, forests are present, and a large share of North American industrial roundwood is produced. These trends also threaten critical habitat for at-risk forest-dependent species and forest-based recreation opportunities. Forest loss related to urban expansion is projected to accelerate forest fragmentation, reduce the habitat of species which need continuous habitat and alter forest types and compositions, with attendant effects on ecosystem goods and service provision and availability of critical habitats. Forests are lost and suffer fragmentation due to expansion of urban areas and infrastructure, also in other parts of the ECE Region, although the pace of change is slower than in the USA.

War and other human-caused catastrophe also cause forest degradation in the ECE Region. Examples are radiation damage around the Chernobyl nuclear power plant

which has stopped forest management and destroyed all sale value of the wood over a very large area¹⁵, as well as mining operations, which can devastate large areas in perpetuity, and war. Forests bear the scars of the second, and even the first world wars (overcutting, metal embedded in trees, etc.), while large forest areas of former Yugoslavia are still inaccessible because of landmines¹⁶.

In summary, there is no objective comprehensive information on forest degradation, defined as reduction of canopy cover falling short of deforestation, in the ECE Region, but there are many examples of forest damage and degradation, from a variety of causes, which reduce the forests' ability to carry out their full range of functions.

As regards protection and restoration, the response varies according to the threat. Fire management is carried out all over the region. After storms, wood is removed, at least in areas where forests are managed intensively, and measures taken to stabilise markets. Forest fragmentation is considered in land use strategies and rural development plans. There are programmes to remove land mines. For some types of forest degradation, few active responses are possible; little can be done to prevent the spread of most insects, only to slow it and minimise the consequences, while all restoration measures are impossible in heavily radioactive areas, because of danger to workers and the risk of spreading the radioactive material over wider areas.¹⁷

¹⁵ The Exclusion Zone covers 2,600 km², much of which was forest before the accident or is now returning to forest.

¹⁶ In Bosnia and Herzegovina, according to the Bosnia and Herzegovina Mine Action Centre, 1218 km² of land, 2.4% of the national area, are contaminated with mines. It is safe to assume that forests, which are less frequented than urban or agricultural areas, account for a significant part of the contaminated area. While Bosnia and Herzegovina is probably the most affected country, there are significant mine contaminated areas in other countries of the former Yugoslavia.

¹⁷ This danger remains, as the lack of management allows undergrowth to build up, significantly increasing the severity of fires, which themselves distribute the radioactive material over wide areas.

2.2 GLOBAL OBJECTIVE 2:

ENHANCE FOREST-BASED ECONOMIC, SOCIAL AND ENVIRONMENTAL BENEFITS, INCLUDING BY IMPROVING THE LIVELIHOODS OF FOREST DEPENDENT PEOPLE

INTRODUCTION: HOW TO APPROACH MEASURING GLOBAL OBJECTIVE 2

This chapter provides information to describe the benefits provided by forests to people in the ECE Region and quantify them to the extent possible. These benefits are divided by the wording of the global objective into three major categories: economic benefits, social benefits, and environmental benefits, though it should be noted that there is often considerable overlap between these categories; environmental benefits (water flow regulation for example) will often have important economic and social dimensions. In addition to these three general categories of benefits, this section also considers two important specific benefits: (1) forest sector contributions to the livelihoods of forest dependent peoples; and (2) forest contributions to climate change mitigation, an important issue considered also elsewhere in this report, but which fully extends into the economic, social and environmental arenas. In the following sections, each of the benefit categories is briefly evaluated in terms of whether benefits have been increasing in the ECE Region. This summary assessment is then followed by a presentation of supporting analysis and, where available, data.

Generally speaking, two fundamental elements will determine the amount and nature of benefits forests provide to people. The first is the biophysical characteristics of the forest resource, and the second is the socioeconomic characteristics of the populations receiving the benefits through various interactions with the biophysical resource. These two elements loosely correspond to the economic concepts of supply and demand, and must be considered simultaneously.

The enumeration and display of forest benefits is challenging for a number of reasons. First and foremost, many of these benefits are based on the subjective impressions of numerous different beneficiaries—the biophysical dimensions of specific forest properties or outputs may be directly measurable, but the values society places on them often are not. For many forest benefits, markets have not succeeded in attaching a realistic or accepted value to the benefits supplied or consumed. Second, with the exception of a relatively small list of output variables (e.g. volumes of wood harvested or recreation user-days), there are no explicit measures quantifying the physical dimensions of specific forest benefits, much less the values (economic or otherwise) these benefits convey to people. Third, certain forest benefits may not be recognized at all until they are lost, particularly in the area of environmental benefits. And finally, there is the question of the intrinsic value which people place on the existence of forest ecosystems and their various components regardless of any specific use or benefit they might derive from them. Existence values are not quantified in this report, but they should nonetheless be recognized as an important component of the total benefits forest supply to society.

Any attempt at a comprehensive description of forest benefits will be incomplete, subject to broad interpretation, and very approximate because of the heterogeneity of the region. This need not be a barrier to analysis, but it is a point of caution for analysts and readers alike.

OVERVIEW: RESOURCE AND SOCIOECONOMIC FACTORS INFLUENCING FOREST BENEFITS

FORESTS AND POPULATIONS

The biophysical characteristics of forests in the ECE Region are summarised elsewhere in this study. For the purposes of understanding benefits derived from these forests, it is important to know the extent and distribution of these resources relative to human populations, and their productive capacity relative to the goods and services local populations can derive from them (though certain benefits such as GHG mitigation or biodiversity conservation may extend to broader regional or even global populations). All else being equal, countries with large areas of forest relative to population will exhibit higher levels of forest benefits per head of population than will sparsely forested countries, though the per-hectare benefits in the latter case may be larger. Likewise, forests providing goods and services in demand (timber for wood products being just one example) will provide more benefits for people than forests whose benefits do not fit the needs of the relevant population.

Socioeconomic characteristics of beneficiary populations will fundamentally shape the nature and extent of these benefits. Key characteristics include such elements as overall stage of economic development, population density, levels of urbanization, traditional dependence on forest resources, and current economic structure, specifically in regard to forest-related product and service sectors. Whereas less developed countries with larger rural populations, particularly those with long-standing traditions of forest use, may benefit extensively from subsistence use and forest contributions to traditional lifestyles (and this point is especially true for indigenous peoples), more developed, urbanized countries will often garner more benefits from amenity values and

ecosystem services. While countries with large wood products industries will rely on forests for generation of employment and income, other countries may derive their principle economic benefits from recreation and tourism, or the provision of ecosystem services to concentrated urban populations.

The countries of the ECE Region mostly fall into the medium to high income and development categories, but they exhibit considerable variation across many of these key socioeconomic dimensions. Moreover, variance within a country can be high, especially in large countries with extensive rural lands distant from population centres. Many countries, particularly those with extensive forests, will display a mix of traditional activities, industrial wood production, recreation and tourism and a reliance on ecosystem services, sometimes concentrated in the same areas. At other times, these trends may be distributed across broader landscapes and regions.

MEASURES DESCRIBING THE GENERAL RELATIONSHIP BETWEEN PEOPLE AND FORESTS

Tables 2.2.1 and 2.2.2 display a number of key statistics pertinent to the relationship between people and forests. Forest area gives a general indication of the prevalence of forest ecosystems in the regions in question, and per-capita forest area indicates the extent of forest resources relative to population. Per-capita income and urbanization provides a general indication of the level of development and the types of benefits citizens might seek from their forests. Income from wood products production as a percent of total income provides a relatively direct measure of the

importance of the wood products sector in the overall economy, though it should be noted that this is by no means a measure of total economic contributions—other

economic benefits may be equivalent or even larger, but they are generally not directly measured in national income statistics.

Table 2.2.1
General demographic and economic measures in 2010

Source: Annex 3

	Population		GNP		Urbanization	
	Number (million)	Growth 2000-2010	Per capita (2010 US\$)	Growth 2000-2010 (†)	Urban population as % of total	Change 2000-2010 (‡)
ECE East	200	-0.6%	9,030	46.7%	72%	-1.0%
ECE Central	533	0.4%	31,785	8.8%	73%	0.1%
ECE South-East	150	0.3%	7,813	17.9%	56%	2.0%
ECE West	345	1.3%	42,714	8.0%	82%	0.4%
ECE Total	1,235	0.5%	22,835	10.3%	73%	0.1%

† Calculated based on incomplete data for some smaller countries. Figures (\$) corrected for inflation using U.S. inflation rate—figures are very approximate.

‡ Subject to varying definitions of urban and rural land applied in reporting countries.

Table 2.2.2
Forest-related demographic measures in 2010

Source: Annex 3

	Population Density	Forest area			
	Person / ha	Million ha	Change 2000-2010 %	% of total land	ha/person
ECE East	0.12	901	0.2%	52%	4.5
ECE Central	1.10	203	2.6%	42%	0.4
ECE South-East	0.33	56	3.7%	11%	0.4
ECE West	0.19	721	0.5%	39%	2.1
ECE Total	0.28	1,881	0.7%	42%	1.5

ECONOMIC BENEFITS OF FORESTS

This section considers the economic benefits forests provide to people. These benefits extend well beyond the goods and services that are traded in markets—indeed anything that is valued by people can be said to have an economic component—but the economic data describing these benefits is generally restricted to cash transactions for traded goods and services. For this reason, the information presented here treats only a limited subset of the total economic benefits supplied by forests in the ECE Region.

Have the economic benefits supplied by ECE Region forests increased?

MAYBE: Total fellings of industrial roundwood have been stable (except in ECE West, where there has been a decline of about a third between 2006 and 2009). Trends in other economic areas, notably recreation and tourism, are unclear but increased per capita incomes throughout the ECE Region would indicate increased activity overall and thereby increased economic activity associated with forests. These economic benefits are not fully measured in forest sector reporting, but they are likely considerable.

NO: Except for in ECE South-East, forest sector contributions to GDP have fallen across the ECE Region, both in absolute and in relative terms. Moreover, ongoing productivity increases and cyclical downturns have resulted in sharp declines in forest sector employment. While efficiency gains from increased productivity represent a net gain for economies on the whole, the impacts on specific populations and specific forest sector activities cannot be ignored. These impacts have been exacerbated by the 2008 recession, resulting in concentrated unemployment and economic hardship in specific forest-related sectors and regions (these issues

are considered more fully in the section on livelihoods below).

Wood products production, trade and employment

For most people, the production and trade of wood products is probably the most familiar measure of economic activity associated with forests. Wood products production volumes and values, employment and income, and exports and imports are all common measures reported at the national level and consolidated in regional or global reporting efforts. The following analysis is restricted to employment, trade and forest sector contributions to gross value-added (GVA).

Forest sector contributions to GVA, which can be taken as a close proxy for contributions to GDP, are shown by region in Table 2.2.3 and Figure 2.2.2. They show a steep decline in the forest sector's share across all the ECE regions, over the last decade, and absolute declines in ECE West and Central. In ECE West, the sector's share of the economy almost halved, falling from 1.2% to 0.7% over the ten years ending in 2011, and, over the same period, annual contributions declined by approximately \$60 billion (or 35%) in inflation adjusted dollars. The declining share reflects in part a broad-scale secular trend in which primary industries (e.g. forestry and agriculture) and traditional manufactures (e.g. lumber) experience declining relative shares as growing economies expand into new manufacturing areas and service activities. Nevertheless, the declines are striking in their size and consistency across the ECE Region. The 2008 global recession, with its heavy impacts in the housing sector, no doubt suppressed production levels in 2005-2013, particularly in North America (see Figure 2.2.3 and Table 2.2.4). An additional factor is the decline in demand for newsprint and related paper products

resulting from substitution by electronic media. The forest sector GVA contribution figures shown in Table 2.2.3 indicate that the total value added by the forest sector also fell sharply, by nearly a quarter over a decade. The other key point to notice in the GVA contributions estimates is the relatively high rate of growth in total forest sector GVA contributions in ECE South-East

combined with a relatively low share for the sector in GDP as a whole. This finding indicates rapid growth from a relatively small initial base, but the low sector share likely reflects the relatively limited forest resources in the region. Turkey, the dominant wood products producer in the region, has a substantial and growing wood products sector.

Table 2.2.3
Contribution of the forest sector to gross domestic product

Source: FAO, 2014.

	Share of GDP (percent)			Contribution to GDP (\$ billion)		
	2000	2005	2011	2000	2005	2011
ECE East	1.3%	1.0%	0.8%	14.6	15.6	15.2
ECE Central	1.2%	1.0%	0.9%	176.5	159.5	149.1
ECE South-East	0.5%	0.5%	0.6%	3.9	4.4	6.7
ECE West	1.2%	1.0%	0.7%	178.8	153.0	115.5
ECE Total	1.2%	1.0%	0.8%	373.8	332.5	286.4

Figure 2.2.1
Forest sector's percentage of gross value added, by country, 2010

Source: FAO, 2014

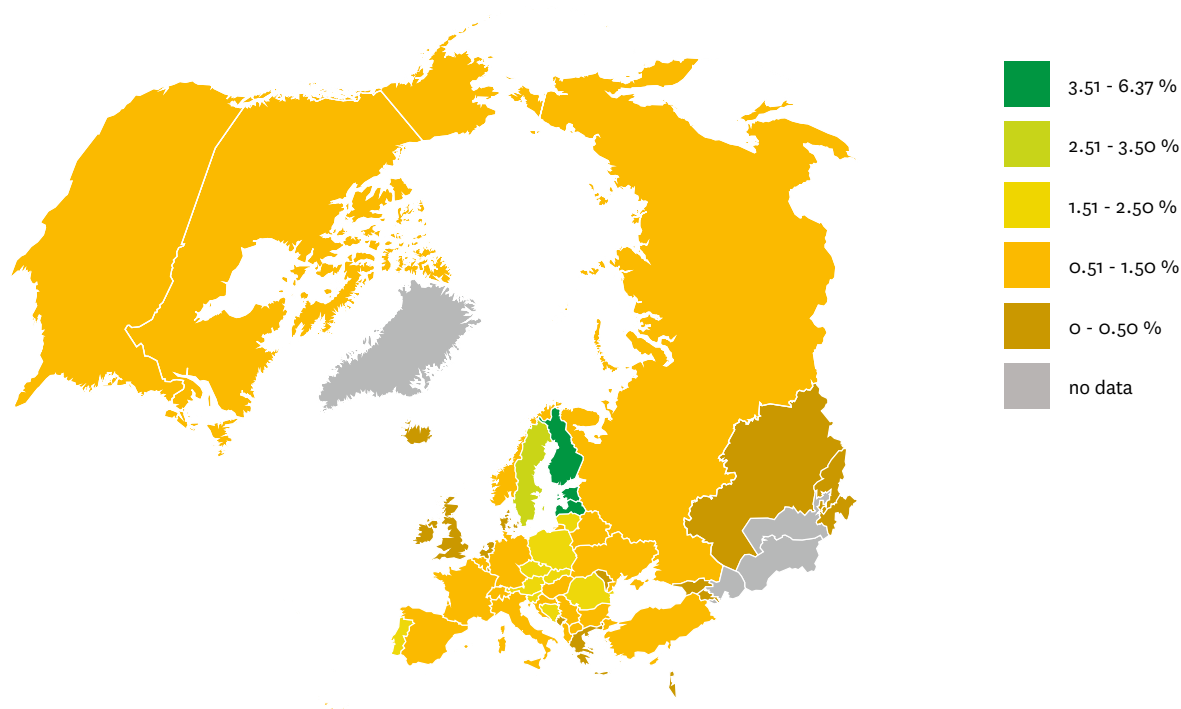
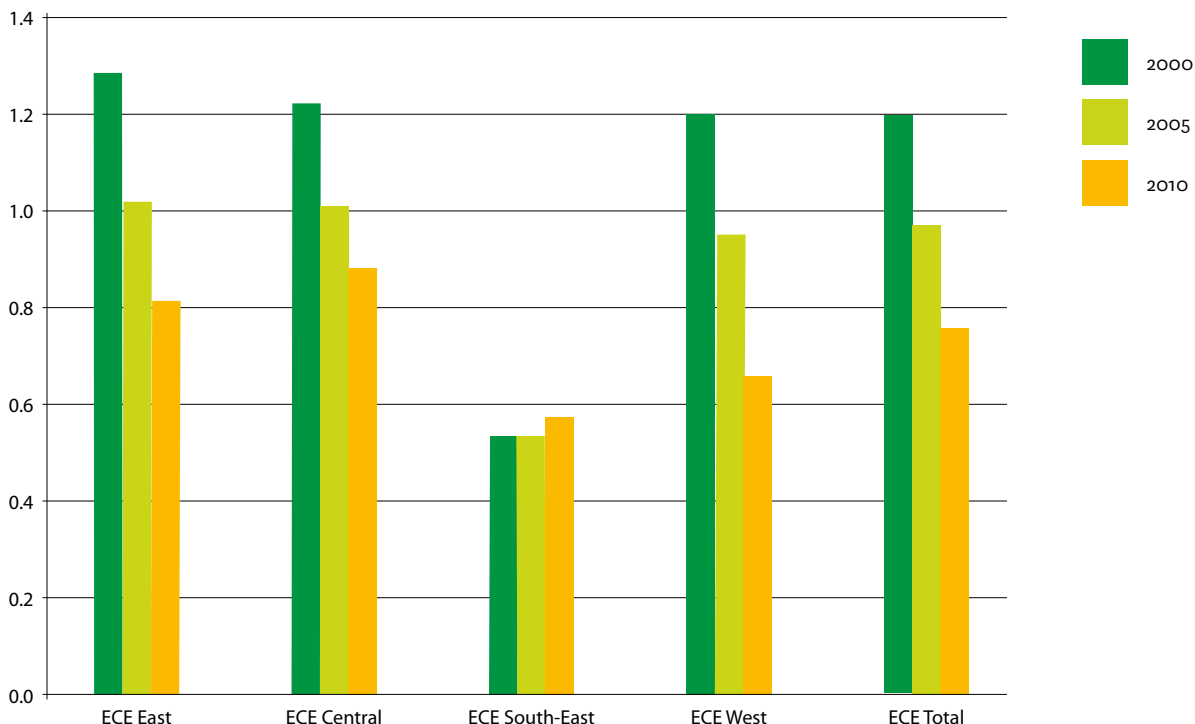


Figure 2.2.2
Forest sector's percentage of gross value added, 2000-2011, by region

Source: Annex 3



A country level calculation for forest sector contributions to Gross Value Added (GVA) is displayed in Figure 2.2.1. Here, the relative concentration of forest sector revenues in the countries of the Baltic region and Eastern Europe is clearly evident.

The estimates for GVA contributions are limited to traditional wood products sectors (production of sawnwood, panels,

pulp and paper), and they do not include important “downstream” uses for solid wood and fibre. These uses include housing construction, furniture, energy (except perhaps as a by-product of wood products production), and a variety of other products that, taken together, constitute a major source of value added processing and economic benefits reliant to greater or lesser degree on the wood products sector.

Figure 2.2.3
Removals of industrial roundwood and wood fuel, by region, annual data, 2000-2013

Source: FAO, FAOSTAT, 2014

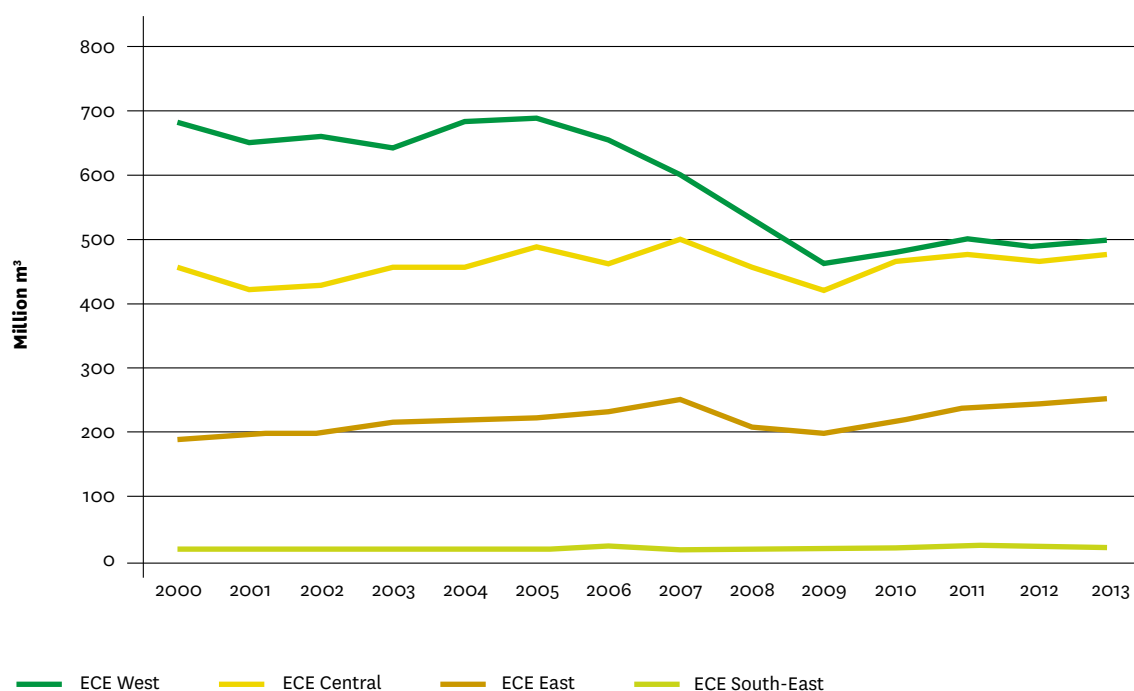


Table 2.2.4
Removals of industrial roundwood and wood fuel, by region, 2000-2013

Source: FAO, FAOSTAT, 2014

	Total removals (million m ³)			
	2000	2005	2010	2013
ECE East	189	223	220	248
ECE Central	455	486	467	474
ECE South-East	19	20	24	24
ECE West	680	684	477	497
ECE Total	1,343	1,412	1,188	1,244

Trade provides another measure of the economic role of wood products in the ECE Region. Figure 2.2.4 shows estimated net trade in forest products for the country groups. These data conform to the general picture of ECE Region forest sector activity provided by the other statistics presented above. North America (Canada and USA) and major production countries in the ECE East (Russia and Ukraine) use their ample forest resources to produce wood products for export. ECE Central, though possessing major wood products producing countries that trade globally, has a smaller net trade balance. And ECE South-East, with limited resources and production capacity (aside

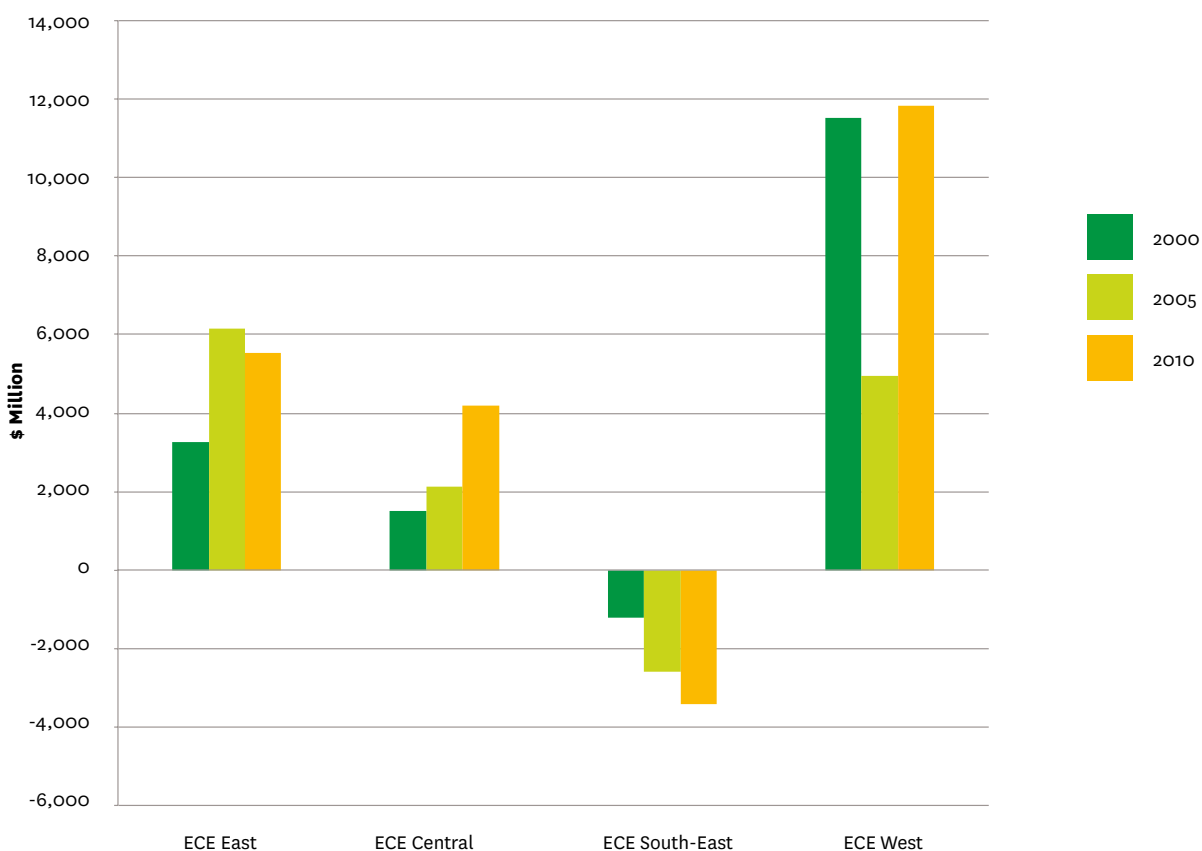
from Turkey), increasingly relies on wood products imports.

The apparent trends in Figure 2.2.4 are worth noting. Amongst these are: (1) the rapid increase in ECE Central net exports; (2) the 2005 drop in exports for ECE West, presumably due to the strength of the US housing market, which absorbed Canadian exports which might otherwise have gone outside the region; and (3) the failure of Russia to further develop its export markets. However, data reliability and the role of exchange rates and related factors suggest that additional analysis is needed before affirming these points.

Figure 2.2.4
Net trade in forest products total, 2000-2010

Source: UNECE/FAO, 2014

Note: net trade is exports minus imports.



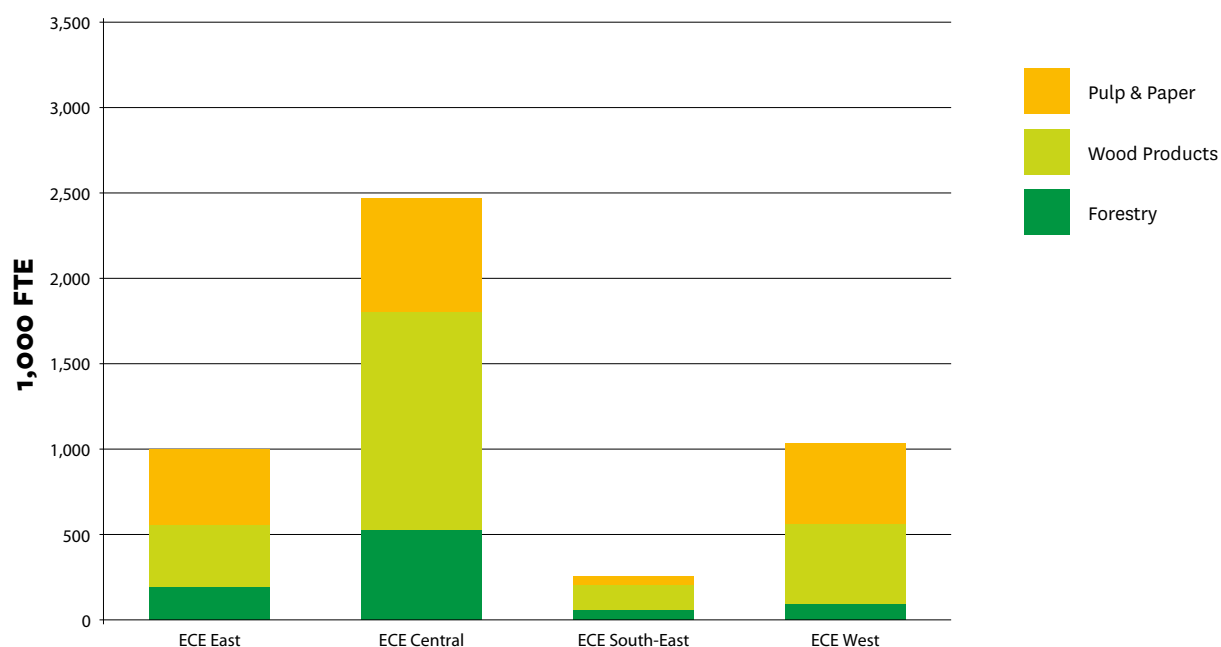
Employment is another measure of forest sector activity and thereby the economic contribution of forests to people. Consistent employment figures are available for most ECE countries. However, a number of smaller ECE Central countries do not report significant employment in the sector, and Turkey and the Russian Federation are the only countries reporting employment in all production categories in their respective regions. Moreover, employment statistics are highly dependent upon domestic reporting conventions and definitions, which vary considerably between countries. These facts should be remembered when considering the employment statistics presented here and elsewhere in the report.

Employment in production of solid wood products (mostly sawnwood and panels)

is the largest single category, driven by the large number of employees in this subsector in ECE Central (Figure 2.2.5 and Table 2.2.5). Available FAO FRA data indicate employment declines between 2000 and 2010 in ECE East and ECE Central on the order of 20%, while ECE Southeast exhibits a slight increase (though this is based on only one reporting country—Turkey). Forestry employment in ECE West displays a 33% decline, while the forest sector as a whole experienced a 38% decline, traceable most directly to the cyclical contraction in the U.S. housing market but also to the long-term decline in the U.S. and Canadian paper sectors. In the case of the USA, this decline is linked most strongly to the decline in the manufacturing sector, whose output peaked in 1999. However, gains in labour productivity also contributed to these employment declines.

Figure 2.2.5
Employment in the forest sector, 2010

Source: Annex 3



A fall in employment may be caused either by a decline in output or by an increase in labour productivity, or a combination of the two.

The persistent declines in forest sector employment throughout the ECE Region are a sign of declining economic benefits from the sector, at least as regards employee incomes. Some of these declines, particularly in ECE West after 2005, are the result of falling production volumes. However, production volumes have been relatively stable in other ECE regions, and the majority of long-term declines across the entire region are likely due to increased labour productivity. In terms of total economic benefits, high labour productivity in the wood products sector results in net gains, both in terms of delivering value to consumers and in fostering increased

value-added production in downstream applications (which are not measured here).

In the future, it is unlikely that forest products employment numbers will significantly expand, even if gross production of forest products increases. Like in most industries, forest products and wood harvesting are subject to ongoing productivity gains from technology. The impact of the resulting employment declines has been felt throughout the ECE Region and will likely continue into the future, particularly in regions with outmoded production technology subject to replacement. The concentrated impacts of continuing employment declines fall heavily on specific groups of people and the localities where they live. This issue is revisited in the section on forest livelihoods later in this chapter (Figure 2.2.6).

Figure 2.2.6
ECE Region, employment, 2000-2010

Source: Annex 3

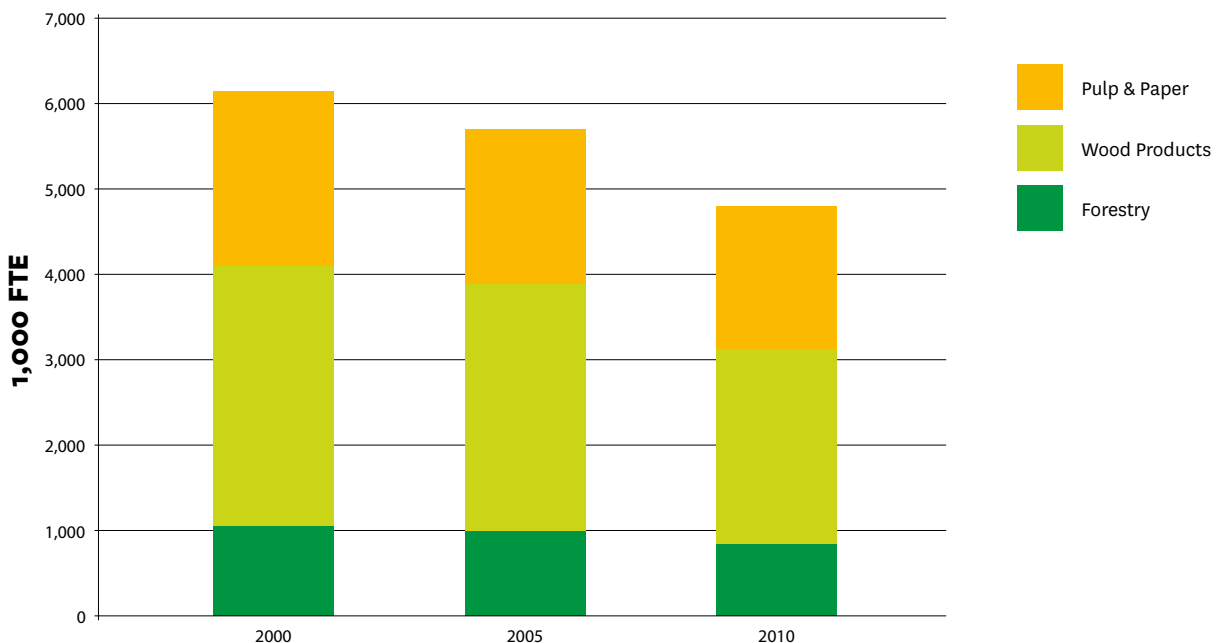


Table 2.2.5
Forest sector employment by region, 1000 FTE, 2000-2010
Source: Annex 3

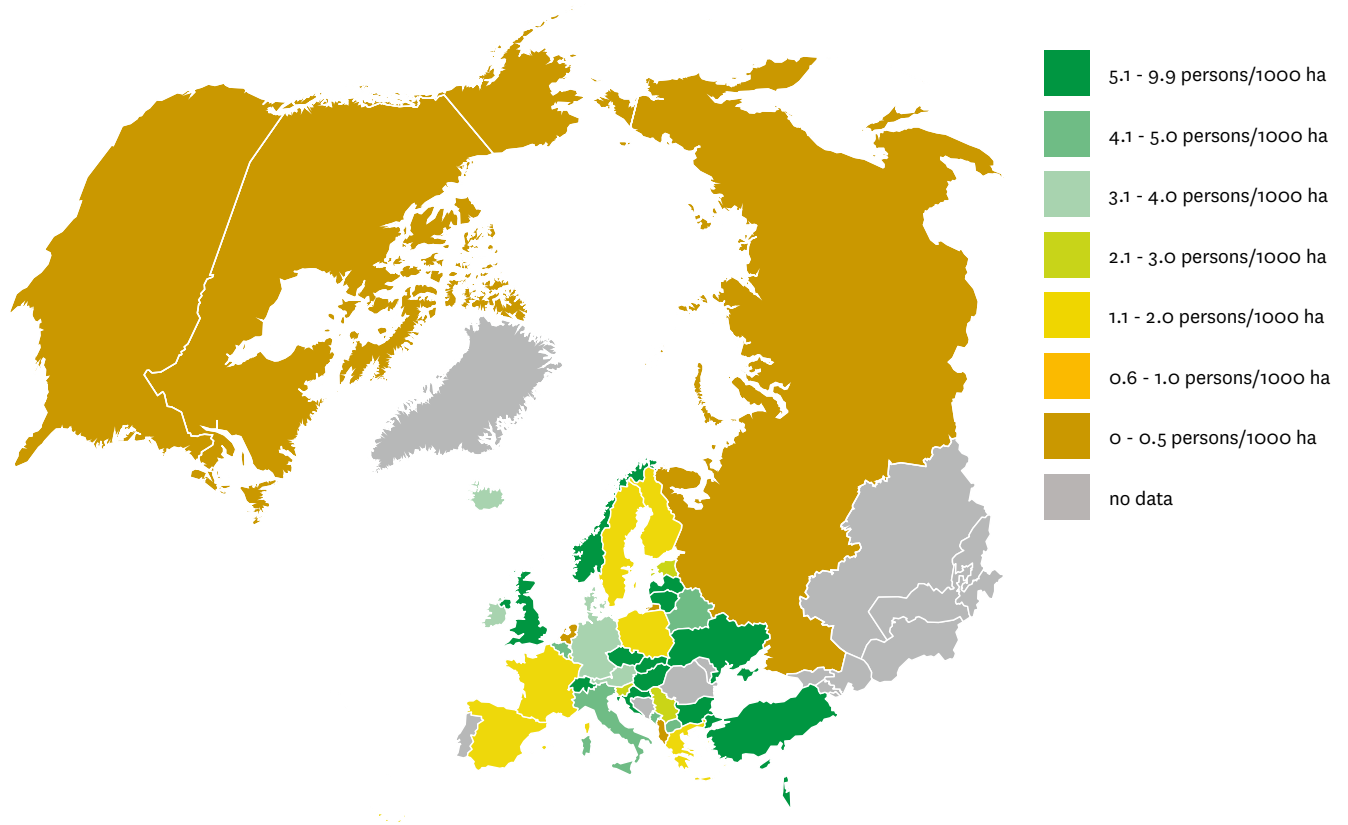
		Employment			
		2000	2005	2010	2000-2010 % Change
Forestry	East	332	302	174	-48
	Central	549	521	514	-6
	South-East	51	43	63	23
	West	161	140	107	-34
	ECE Total	1,093	1,007	858	-21
Solid Wood Products	East	461	419	383	-17
	Central	1,620	1,579	1,266	-22
	South-East	132	132	130	-1
	West	781	730	454	-42
	ECE Total	2,994	2,860	2,234	-25
Pulp & Paper	East	445	422	440	-1
	Central	883	793	696	-21
	South-East	42	42	44	+4
	West	720	585	469	-35
	ECE Total	2,091	1,843	1,649	-21
Total	East	1,238	1,143	997	-19
	Central	3,052	2,893	2,477	-19
	South-East	226	218	237	+5
	West	1,662	1,456	1,030	-38
	ECE Total	6,177	5,710	4,741	-23

*Note: Regional totals presented here are a summation of reporting countries. Smaller countries in ECE Central, and all but Turkey in ECE South-East and the Russian Federation in ECE East, did not report employment in all categories or years. The table therefore represents a sample and not a full accounting, though major producer countries are fully represented.

Figure 2.2.7 displays employment in forestry (only includes forest management and harvest) per hectare of forest land. These data show differences in forest ecosystems and remoteness (more people are needed for the same operation in difficult terrain; remote forests are not intensively managed, for many reasons (unit sizes tend to be larger in remote

areas), but also the productivity of the forest labour force. In some areas with flat terrain and expensive labour (e.g. Finland, Sweden) mechanisation is very advanced, so fewer workers are needed to harvest or manage the same number of hectares. Elsewhere, low wages, difficult terrain and national employment habits, encourage the use of more labour.

Figure 2.2.7
Forestry employment, persons per 1,000 ha of forest, 2010
 Source: Annex 3



NON-WOOD FOREST PRODUCTS

Forests also provide people with various non-wood products, some of which are formally traded in markets but many of which are not. Even in the case of traded goods, these products may not be adequately identified, particularly in regard to their relationship to forests. Moreover, the prices for many traded non-wood forest products are extremely sensitive to the point in the production process where these prices are measured; these pricing points are not consistently applied across all reporting countries or products. As a result, available statistics on the production and use of non-wood forest products only cover a small proportion of the total amount of goods produced and consumed and give a very inadequate picture of their total value.

The FAO Forest Resources Assessment (FRA) does include reporting categories for non-wood forest products, but response to the FAO data calls are incomplete, with a maximum of 20 countries (out of 56 total) reporting for a given category in a given reporting year,¹⁸ significantly less in other instances, and no countries responding in many others. The data that is available identifies the following products as major NWFP categories:

- Christmas trees (which some consider an agricultural crop not a forest product)
- Fruits, berries and edible nuts
- Cork
- Mushrooms and truffles
- Decorative foliage
- Resins, medicinals, aromatics, colorants and dyes

Reported cash revenues for these products exceed one billion euros, though, owing to under reporting, actual revenues are probably much higher.

In addition to the traded product categories covered by the FRA, there are numerous non-wood forest products that are never formally traded but have demonstrable economic value in terms of their ability to substitute directly for marketed goods. Subsistence harvest of wild game is a good example of this. Significant recreational, cultural and even spiritual values may also be associated with these goods. None of these values are reflected in available data for the ECE Region.

In informal consultations conducted as part of an initial review of this document, representatives from a number of ECE countries stressed the importance of foodstuffs gathered from local forests, stating that this is often a principal concern for many rural residents in forested areas. The economic value of these goods in terms of consumer surplus is probably inversely proportional to the incomes of the people engaging in these activities.

OTHER ECONOMIC BENEFITS FROM FORESTS

Various other benefits from forest ecosystems have explicit economic components, though they are often difficult to measure (both in physical and value terms) and seldom reported in a consistent fashion, particularly at the international level. Forest-based recreation and tourism, for example, is a major activity that generates employment and income for local communities and for firms engaged in providing goods and services supporting this activity. While determining the proportion of this activity that is directly attributable to forest ecosystems, as opposed to other cultural or geographic elements in the landscape, is problematic both in practical and in theoretical terms, forests undoubtedly play an important role in supporting landscape amenities, particularly in areas where nature is a major component driving tourism and recreation activity.

¹⁸ Christmas trees in 2005.

Hunting (for sport, not subsistence) is a major economic activity which often takes place in forests, and can bring in significant revenue, from the hunting licences, the accompanying facilities (accommodation, guiding, etc.), and the sale of game meat. Although comprehensive data are not available, the *State of Europe's Forests 2011* reported the value of marketed game meat in the pan-European region around 2010 as €409 million. The value of hunting licences was €42 million in Germany, €41 million in France and €32 million in Austria. In the USA, according to the RPA Assessment there are 12.5 million hunters, 5.5% of the population, although the number of hunters is 12.4% less than in 1970.

Where markets can be established for forest ecosystem services, the value of these services can be determined directly through trade. Tradable conservation credits are an example of this. In other instances, avoided costs may be used to gauge the value of particular ecosystem services. The use of forests as “green infrastructure” for watershed management, for example, may substitute for costly investments in water treatment facilities. In many cases, however, the specific ecosystem services being traded or otherwise measured will be bundled with other public goods not measured, and the reported values will significantly underestimate the total value generated by the forest area in question. We will return to the question of ecosystem services in the section treating environmental benefits below. Likewise, carbon sequestration constitutes a specific forest-based ecosystem service with a measurable economic component which will be discussed in the subsequent section on forest contributions to climate change mitigation.

SOCIAL BENEFITS OF FORESTS

The social benefits people derive from forests come in many different forms, most of which are not amenable to direct

quantified measurement at the broad scale considered in this report. As a result, we are unable to provide quantified estimates of social benefits and how they have changed over the last decade. We can, however, propose some general conclusions based on social trends and forest management practices.

HAVE THE SOCIAL BENEFITS SUPPLIED BY ECE REGION FORESTS INCREASED?

YES: Growing incomes and populations throughout the ECE Region indicate increased access to forest areas for recreation and related uses. Forest management activities increasingly recognize amenity and use values both in forested hinterlands and in forested areas in proximity to urban areas. Additionally, social values are more commonly recognized in forest planning and assessment activities, ranging from (for example) the Montréal Process Criteria and Indicators to local management practices, though the extent to which this recognition has resulted in actual improvements in social benefit provision is unclear.

NO: Though not immediately evident in the regional statistics examined in this report, fragmentation and other forms of forest degradation are no doubt occurring in localities throughout the ECE Region (see USDA Forest Service 2011 for specific example from the United States), and these factors will, in turn, negatively affect the provision of social benefits. Additionally, declines in forest sector employment and concomitant hardship in producing regions will result in deteriorating social conditions in these areas. Safety and health provisions for forest workers are probably uneven across the ECE Region.

TYPES OF SOCIAL BENEFITS SUPPLIED BY FORESTS

Even though we cannot provide data to describe them, we can provide a brief enumeration of the various types of values

and activities these benefits may entail:

- **Aesthetic amenities.** Forests enhance the beauty of the landscapes in which they are found, ranging from urban parks and streets, to rural landscapes and wilderness reserves.
- **Recreational settings.** Forests often serve as settings for various recreational activities, many of which serve to enhance the connection between people and nature (e.g. nature walks), others which enhance community (e.g. family gatherings in forested settings), and others which enhance human health through exercise.
- **Psychological and health benefits.** Various studies have documented the correlation between the proximity of trees and forests and human well-being. This may be linked to the aesthetic amenities and recreational settings noted above, but the underlying cause of this correlation is still unclear.
- **Traditional cultural activities.** Forests provide settings and materials, or are otherwise linked to many traditional cultural activities (think of Christmas trees). This is particularly true for indigenous peoples and local residents in forested areas. Subsistence hunting and gathering is an important subset of this category.
- **Sense of place and a link to the past.** As an integral part of landscapes, forests and trees help foster people's identification with specific places and their representative ecosystems. For urban residents separated from their birthplaces (or from a general identification with rural lifestyles), specific forest settings may provide a link to one's familial roots or cultural heritage (the predominance of traditional forest cabins in Finland are an example of this).
- **Respite from urban environments.**

Whether a short walk in a local park or a weekend hike in the woods, forested settings can provide relief from the noise and hectic activity of urban lifestyles.

- **Existence and conservation value.** Many people value the continued existence of forests and their ecosystem components in their own right regardless of whether they will provide a specific benefit or use now or in the future. For many people, forests also have an important spiritual value.

EXAMPLES OF SOCIAL BENEFITS SUPPLIED BY FORESTS

There is considerable overlap between these categories and certain benefits considered under economic and environmental headings. As a result, many forest conservation and management regimes aim to preserve or enhance multiple and often competing benefits; activities targeted specifically or exclusively to social values are relatively rare. While consistent data tracking on social benefits are scarce, these benefits often figure prominently in policy debates, especially when they arise in conflict with resource extraction interests. At the international, regional and national level, various policy statements have affirmed the social value of forests and the need to address these values through sustainable forest management. (see, for example, MCPFE Vienna Resolution V3¹⁹) Likewise, there are numerous concrete examples of planning efforts and management prescriptions aimed at maintaining aspects such as aesthetic qualities, recreation access, or general conservation of forest ecosystems and their diversity (though whether these prescriptions are always successful in the face of multiple stresses on forest systems is another question). Finally, the growing interest and resources devoted to urban and peri-urban forestry is an explicit recognition of the way forests can enhance

¹⁹ Fourth Ministerial Conference on the Protection of Forests in Europe (http://www.foresteurope.org/docs/MC/MC_vienna_resolution_v3.pdf).

the lives of urban populations through the provision of environmental and social benefits.

While the measurement of social benefits is difficult from both a practical and a theoretical standpoint, the importance of these and closely related environmental benefits is widely recognized. Informal consultations with ECE country representatives in the course of reviewing initial versions of this document stressed this fact. Many ECE countries have relatively small to non-existent commercial forest sectors, and, as their representatives' comments made clear, in these cases it is the provision of social and environmental benefits that motivates their international commitments and their engagement in forest management in general; these benefits and how to manage for them are a primary concern.

ENHANCING INFORMATION ON THE SOCIAL BENEFITS OF FORESTS

In order to develop better broad scale tracking of social benefits in the ECE Region, information collection strategies could focus on three avenues of research: (1) describing the relevant characteristics of the forest resources providing the benefits; (2) characteristics of the recipient populations; and (3) modelling or similar techniques linking (1) and (2) in order to estimate benefits.

Research into relevant forest characteristics could initially focus on questions of forest accessibility. The per-capita forest area figures shown above are a first approximation of this, but to be useful, measures of proximity to population centres and public accessibility would have to be incorporated.

Descriptions of population characteristics can first be improved through more detailed demographic information. Public surveys of people's attitudes and patterns

of forest use could provide additional information on beneficiaries. Modelling approaches for estimating social benefits will depend on initial success in developing measures for forest and population characteristics.

Work in all three areas will be hampered by the practical challenges of consistent application across the ECE Region (or any other large grouping of countries). In the meantime, individual studies specific to particular times or places can be used to provide indicative information about social benefits across the region as a whole.

ENVIRONMENTAL BENEFITS OF FORESTS

Environmental benefits differ from social benefits in that they are not as dependent on the subjective perceptions and values of beneficiary populations as on the actual provision of biophysical characteristics and services. In terms of measurement, however, environmental benefits share many of the same challenges as social benefits.

HAVE THE ENVIRONMENTAL BENEFITS SUPPLIED BY ECE REGION FORESTS INCREASED?

YES: The area of protected forests has generally increased, and forest management efforts across the ECE Region have increasingly incorporated environmental benefits in their planning and implementation activities. Conservation credit exchanges and PES (payments for ecosystem services) schemes are increasingly common. Awareness of the environmental benefits of forests and the need to manage for them is expanding rapidly.

NO: While it is relatively easy to document the expansion of management activities aimed at enhancing environmental benefits, gauging the effect of these activities is more difficult. Ongoing pressure on forests and resulting forest degradation are evident at

local and landscape scales with associated loss of biodiversity and related environmental impacts. Conversion of primary forests to secondary or plantation forests may also result in adverse environmental impacts, but the role of highly productive plantations in reducing pressure on intact forest ecosystems also needs to be considered. Climate change may be compromising forest health through various biophysical processes across the ECE Region, and this, in turn will impact environmental services.

TYPES OF ENVIRONMENTAL BENEFITS SUPPLIED BY FORESTS

As in the case of social benefits, the categorization of environmental benefits is variable, being subject to differing definitions, analytical frameworks, and priority concerns. The following list contains generally recognized categories of environmental benefits, but it is neither definitive nor exhaustive.²⁰

1. **Water management and purification.** Forests serve to regulate water flow, allowing forested catchment areas to store more water in times of heavy rainfall and release it more slowly afterwards, thus mitigating floods and providing more even stream flow in times of drought. Forests receiving snow in the winter provide shade in the spring and into the summer that slows the snowmelt, also providing more even stream flow. Likewise, forests reduce stream sedimentation and enhance water purity, a function that is well recognized in municipal water management systems throughout the ECE Region.
 2. **Soil conservation.** Forests reduce soil erosion and aid in the long-term formulation of new soils. Conservation of existing forest cover and afforestation of barren lands is a principal strategy in soil stabilization and reduction of water erosion. Tree plantings in agricultural lands have been used to stabilize farm soils particularly in areas subject to high winds.
 3. **Protection from landslides and avalanches.** Forests help to stabilize slopes and serve as a barrier to landslides and avalanches. This protective function is a major benefit provided by forests in mountainous regions.
 4. **Biodiversity conservation.** As one of the Earth's principal land cover types, forest ecosystems serve as major reservoirs for biodiversity, which in turn provides multiple benefits to humans in the form of products, scientific knowledge, pollination services and a variety of other goods and services. (This function also confers substantial social benefits in terms of existence and preservation values).
 5. **Carbon sequestration.** As described in detail elsewhere in this report, forests serve as a major sink for carbon, and current net positive rates of carbon sequestration in the forests of the ECE Region help to mitigate carbon emissions from other sources, thereby helping to reduce the threat of global climate change.
 6. **Stabilization of micro-climates.** Forests help reduce local variability in temperature, providing, for example, winter cover for livestock and forest game species or summer shade and temperature reduction in urban areas where forests are present.
 7. **Air pollution abatement.** Forests can absorb pollution and thus purify the air. (However, trees also emit certain volatile gasses that, under certain conditions, can exacerbate local air pollution concentrations).
- The extent to which each of these categories, or other categories not

²⁰ For an often-cited reference on Ecosystem Services, see the Millennium Ecosystem Assessment (2005). Note, however, that "ecosystem services" as defined in that report cover a much more exhaustive set of forest benefits than considered under the heading "environmental benefits" in this report, including various benefits here considered under economic, social, and climate change headings.

identified here, are important, will vary according to location and management objectives. It is imperative that policy makers and managers are sensitive to and explicitly identify specific environmental benefits as they become evident in the process of analysis and planning.

EXAMPLES OF ENVIRONMENTAL BENEFITS SUPPLIED BY FORESTS

Specific examples of environmental benefits from forests in the ECE Region are varied and numerous. The protective functions of forests have long been understood in the populous regions of Europe, and in mountainous countries such as Austria, Georgia and Switzerland, a large proportion of the forest estate is explicitly managed to serve this role. Many cities throughout the region rely on specifically designated forest reserves for their municipal water supplies. In the USA, in New York State, this strategy has been expanded to a broader landscape approach where payments to secure forest conservation on private lands in the Hudson river watershed, and thereby clean drinking water provision for New York City, were made in lieu of investments in a new multi-billion dollar water treatment facility. And in nearby Philadelphia, urban trees and green spaces are being developed explicitly for their storm-water retention capabilities, investments focused on “green infrastructure” as opposed to the expansion of “grey infrastructure” in the form of pipes, culverts and conventional drainage systems.

Many other examples of the use of forests for specific environmental benefits can be found throughout the ECE Region. More often, however, forest conservation and management activities target a broad range of environmental benefits, some explicitly identified and targeted for management but many left unspecified. Various strategies are used to secure and enhance the provision of multiple environmental benefits from forests, ranging from national level management of public forests, to

municipal land management and zoning, to regulations and subsidies affecting private forest land management. Conservation easements, a form of payments for ecosystem services in which governments, NGOs or other entities pay private land owners to forgo development or similar activities on their lands, are becoming increasingly common in some areas.

These and similar efforts represent positive developments in the provision of environmental benefits. At the same time, however, pressure on forests for urban and residential development or resource extraction are increasing as economies in the ECE Region continue to expand. Moreover, dynamic disturbance processes, such as fire, pest infestations and invasive species, likewise threaten health and integrity of forests, and climate change will likely exacerbate these processes. As a result, simply cataloguing the efforts society devotes to securing environmental benefits is not sufficient to measure their ongoing provision. For that, more direct measures of actual benefits produced and received by people in the ECE Region are needed.

ENHANCING INFORMATION ON THE ENVIRONMENTAL BENEFITS OF FORESTS

As in the case of social benefits, there are problems of data gaps and inconsistencies. At the pan-European level, information is collected according to the structure of Criterion 4 of the set of Criteria and Indicators, which has nine indicators.²¹ These indicators address, sometimes indirectly, natural processes or administrative actions, rather than “benefits” to people.

In general, more forests mean more environmental benefits, and, as in the case of social benefits, providing a better description of the location of forests relative to human populations is a good place to begin developing meaningful measures. In this case,

²¹ Tree species composition, regeneration, naturalness, introduced tree species, deadwood, genetic resources, landscape pattern, threatened forest species, protected forests.

however, spatial scale will be specific to particular benefits. Forest contributions to soil and water conservation, for example, should be analysed on a watershed basis, particularly if links to downstream beneficiaries are to be estimated. Contributions to biodiversity conservation, on the other hand, will depend on the habitat demands of the species targeted for conservation (or the broader landscape, if landscape-scale conservation is being implemented).

In some cases, modelling and estimation techniques can be used to convert reported forest characteristics (from forest inventories or remote sensing, for example) into quantified measures of environmental benefits. This is the strategy used to develop estimates of forest carbon sequestration, a particular environmental benefit discussed elsewhere in this report.

LIVELIHOODS: FOREST OWNERS, FOREST WORKERS AND FOREST DEPENDENT INDIGENOUS PEOPLES

The ability to contribute directly to the livelihoods of people is another important benefit of forests. These contributions generally fall under the economic benefits analysis presented above, but it is useful to consider them separately both in order to emphasize their importance, and also because the gross contributions discussed under economic benefits obscure the fact that the jobs and incomes associated with forests are often concentrated amongst forest dependent rural populations. Livelihoods are specifically mentioned in the text of the second global objective.

HAVE THE LIVELIHOODS OF FOREST DEPENDENT PEOPLE BEEN IMPROVED?

MAYBE: Forest dependency is a difficult concept to define, and rural economies are subject to complex long-term dynamics associated with economic

development and urbanization. Indigenous peoples constitute an important subset of potentially forest dependent populations, and the data are insufficient to determine their current status relative to forest benefits. At the very least, this issue is increasingly being recognized, but endemic poverty persists in many indigenous communities and other rural forested areas. Recent trends in the livelihoods of forest owners are also unclear owing to lack of good data.

NO: Sharp declines in forest sector employment have undoubtedly resulted in reduced livelihoods and related hardship for unemployed workers and the communities in which they live.

TYPES OF LIVELIHOOD CONTRIBUTIONS OF FORESTS

There is a general tendency to view livelihood provision mainly in terms of forest sector employment and income. Proximity to forests, however, provides many tangible benefits to rural residents, ranging from subsistence provision of dietary needs, to economic opportunities in tourism or non-wood forest products production, to low cost recreation opportunities and general lifestyle amenities. These benefits often accrue to people with limited economic means living in areas with relatively few economic opportunities or public goods.

Forest contributions to rural livelihoods can be divided into three main categories: (1) cash incomes for people directly engaged in forest sector activities associated with the production of market goods; (2) incomes from additional economic activity generated by the expenditure of forest sector revenues (wages, profits, tax receipts, etc.) in rural communities; and (3) non-cash contributions to livelihoods through the provision of subsistence goods and lifestyle amenities.

In standard cost-benefit analysis, the wages identified in category 1 are treated as a cost rather than an economic benefit, but forest sector jobs and incomes are nonetheless a central concern in many forest policy debates and management activities. While these incomes accrue to specific individuals, the economic wellbeing of forest communities as a whole (identified in category 2), is often the focus of discussion. The non-cash benefits in category 3 generally receive less attention, at least in the ECE Region, probably because they are not amenable to explicit monetary valuation, though subsistence harvest of forest game and foodstuffs does garner focused attention in some cases, particularly where the rights and benefits of indigenous peoples are involved. Lifestyle amenities, also identified in category 3, are generally considered as a social benefit as opposed to a livelihood contribution, but it must be remembered that these amenities often accrue to rural people with relatively low incomes living in areas with few other amenities, and they can provide a major contribution to wellbeing.

FOREST DEPENDENCY

Forest livelihood provision in rural communities is closely associated with the idea of forest dependency. Forest dependency is not a simple concept, especially when considered in relation to livelihood benefit categories 2 and 3 (as identified above), and definitions of dependency vary. Moreover, measures of dependency are contingent on the scale of analysis, with local and landscape scales likely being the most relevant. That being said, estimates of wood products employment and its share in total employment provide a first approximation of forest dependency and livelihood provision specific to the wood products sector. Similar measures for income and employment in other forest sectors (e.g. tourism or non-wood forest products) would certainly be instructive, but they are

unavailable for reasons discussed in the previous section on economic benefits.

All else being equal, forest dependency and the importance of forest livelihood contributions, where they exist, are proportional to geographic isolation and local levels of poverty; small, isolated communities have limited capacity for dynamic adjustment to employment shifts, and for poorer individuals changing locations or occupations can entail very high financial, social and psychological costs. This is true for more isolated timber production regions, and it is particularly true for forest dependent indigenous peoples.

Table 2.2.6 shows the top ten ranked countries by forest sector employment as a share of total employment (panel 1) and in terms of total number of employees in the sector (panel 2). Panel 1, which can be interpreted as a measure of forest dependence or specialisation, is dominated by countries in Eastern or Northern Europe with relatively small total populations. Panel 2 indicates sheer size of the sector and displays a broader distribution of countries across the ECE Region, though, in line with its relatively limited forest resources and wood products sector, ECE Southeast is not represented in panel 2. Once again, it is very important to consider spatial scale when reviewing the information presented in the table. The relatively high concentrations of forest sector employment in the smaller countries in panel 1 indicate a high degree of forest dependence at the national level. While the large wood products producing countries in panel 2 display relatively low levels of forest sector concentration in terms of share of total employment, the sheer size of the sector indicates local concentrations of activity and therefore dependence, and this is especially so in large countries such as the USA, Canada, and Russia with their expansive rural hinterlands distant from urban population centres.

Table 2.2.6

Top ten forest sector countries by employment 2011

Source: Annex 3

By forest sector share of total employment				By total forest sector employment				
	region	% of total employment	1000 persons		region	% of total employment	1000 persons	
	Latvia	Central	3.5%	42	USA	West	0.5%	827
	Estonia	Central	3.1%	22	Russia	East	0.8%	600
	Finland	Central	2.8%	75	Germany	Central	0.7%	317
	Belarus	East	2.5%	112	Italy	Central	1.0%	258
	Slovenia	Central	2.4%	25	Poland	Central	1.4%	252
	Slovakia	Central	2.2%	62	Canada	West	1.2%	234
	Czech Rep.	Central	2.1%	110	Spain	Central	0.7%	162
	Sweden	Central	2.0%	100	France	Central	0.6%	161
	Lithuania	Central	1.7%	28	Turkey	South-East	0.6%	153
	Austria	Central	1.5%	65	Ukraine	East	0.6%	142

CURRENT STATUS OF LIVELIHOOD PROVISION

Productivity gains through technological innovation have exerted sustained downward pressure on labour demand, and the increasing integration of forest industries into global capital and product markets, when combined with the notoriously cyclical nature of wood products markets, has led to rapid fluctuations in investment and employment in the industry. The result has been sharp declines in forest sector employment across the ECE Region, particularly in forestry (primarily harvesting), and in the major producing regions (see Table 2.2.7 and Figure 2.2.8). Between 2000 and 2010, for example, the Russian Federation lost 133 thousand jobs in forestry, or 66 percent of employment in the sub-sector, and 199 thousand jobs in the sector as a whole. Combined losses in North America totalled 633 thousand jobs, a 38 percent decline for the region. ECE Central exhibited substantial employment losses in the wood processing sectors, losing 541 thousand jobs.

The result has been persistent economic hardship in many rural, forest dependent communities, even in relatively wealthy countries like the United States. Owing to spatial concentration and geographic isolation, this issue is likely most acute in sparsely populated regions in the larger producing countries. Moreover, employment impacts in rural communities often occur in the context of long-term rural depopulation as countries in the ECE Region become increasingly urbanized. Policy options for addressing this issue are complex and not easily identified. Where wood processing industries are located in more densely populated regions (say in Germany or in the Puget Sound region of North America) the impacts of employment declines are likely less acute; job losses certainly entail substantial hardship for individuals but overall impacts are obscured by dynamic changes in the much larger regional economies in which they are embedded.

Table 2.2.7

Change of employment in forestry and forest sector in the top five ECE countries by forestry employment declines and in the ECE Region , 2000 to 2010

Source: Annex 3

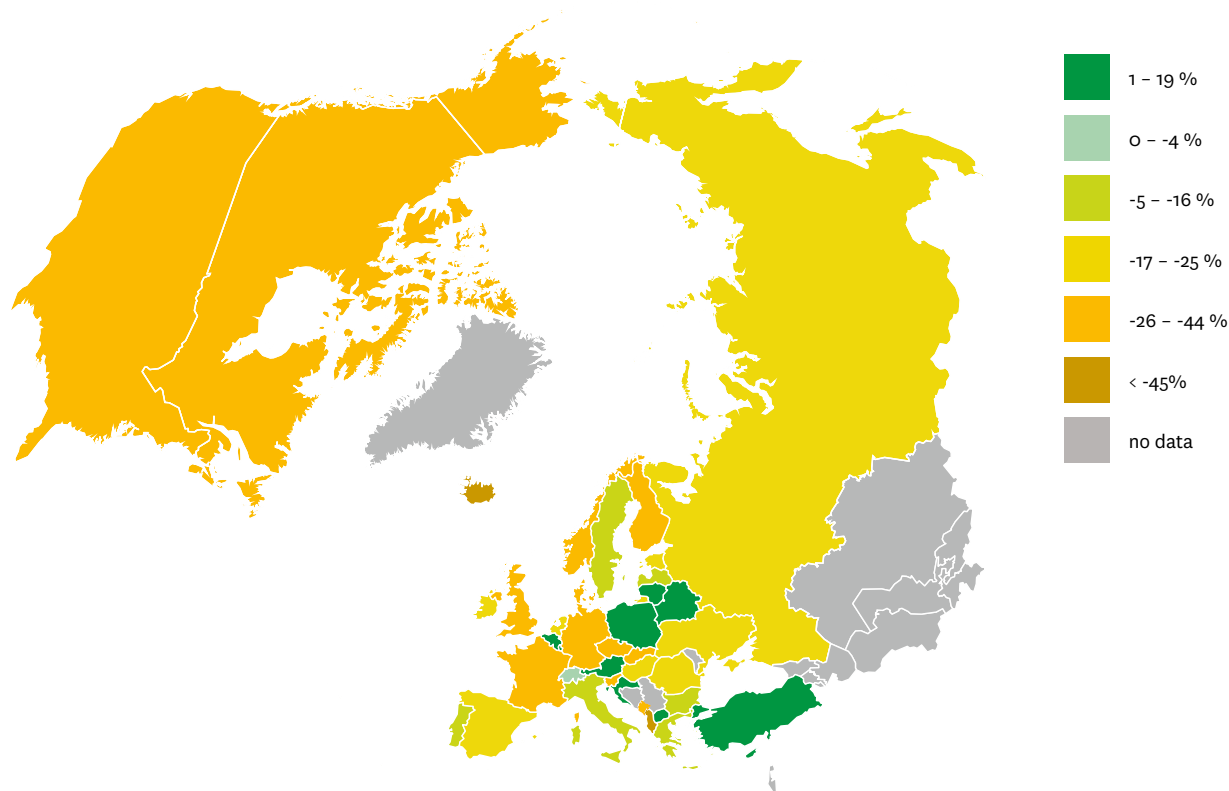
	Change of employment			
	Forestry		Total Sector	
	1,000 FTE	%	1,000 FTE	%
USA	-20	-27%	-504	-39%
Russian Federation	-133	-66%	-199	-20%
Canada	-35	-40%	-129	-35%
Ukraine	-28	-29%	-45	-23%
Czech Republic	-16	-51%	-34	-28%
ECE East	-158	-48%	-241	-19%
ECE Central	-34	-6%	-575	-19%
ECE South-East	12	23%	12	5%
ECE West	-55	-34%	-633	-38%

Note: Total sector employment includes forestry, solid wood products, and pulp and paper sectors.

Figure 2.2.8

Percent change in forest sector employment, 2000-2010

Source: Annex 3



It is unclear whether concentrated economic hardship owing to timber employment declines in rural communities is impacting many countries across the ECE Region. Consultations with country representatives as part of the initial review of this document, for example, failed to elicit positive reactions from many representatives, particularly from smaller countries or from ECE Central. But this form of informal sensing does not constitute hard data or analysis, and the extent to which rural timber dependent communities in the ECE Region have been impacted by recent employment declines remains an important research question.

INDIGENOUS PEOPLES

Indigenous peoples comprise an important subset of forest dependent people and communities. In forested regions, their traditional lifestyles and essential subsistence activities will be directly tied to the nature and productivity of forest ecosystems. Indigenous peoples may also participate in broader national and international economies on the basis of forest resources, through timber production, tourism or the production and sale of traditional goods. In all these cases, ownership, control, and/or access rights to local forests is a crucial issue for indigenous communities, especially in cases where their political influence has been marginalized.

The encroachment of European civilization and the appropriation of native lands in North America left pockets of indigenous populations throughout the continent, many in rural areas with significant forest cover, and the further northward expansion of western civilization in the last century or more has resulted in increased contact and integration of indigenous peoples living in boreal and arctic regions both in North America and on the Eurasian continent. This history would tend to identify North America, the Nordic countries and Russia

as primary focus points in the ECE Region for the indigenous peoples. Other areas, particularly in ECE South-East, have various ethnic minorities with long histories and deep attachments to particular ecosystems. The issues associated with forest dependence, endemic poverty, environmental justice, and a unique relationship with forest ecosystems apply all over the ECE Region.

Unfortunately, we have little consistent information across the ECE Region about forest contributions to livelihoods for indigenous peoples or economic conditions in their communities. We can list country-specific provisions for land tenure and related access rights, and in this regard conditions appear to be improving relative to the first half of the last century. For instance, as reported to UNFF, in Russia, specially protected areas are designated for traditional nature use and traditional lifestyles of indigenous peoples of the North, Siberia and the Far East of the Russian Federation. Many of these areas are forested. In North America, indigenous peoples have secured explicit rights over some forest land, and a number of additional claims are pending. In the Nordic countries, the rights of the Sami People to graze their reindeer are recognized across broad areas of the region's northern lands. These, however, are simply anecdotal examples, and the determination whether such policies are adequate, or equitable, would have to rely on a case-by-case analysis of conditions and policies within specific countries.

FOREST OWNERS

According to the private forest owners association in Europe, CEPP, there are about 16 million private forest owners in Europe. Private holdings range from very small – less than one hectare – to very large. In the USA, according to the RPA Assessment, in 2007, 11.3 million private forest owners owned 56 percent of U.S.

forest land. These owners include private individuals, Native American tribes, or corporate entities. More than 60 percent of private forest owners own between 1 and 9 acres (0.4 to 3.6 ha) of forest land, although most of the private forest land acreage is in holdings of at least 200 acres (81 ha). Outside the USA and ECE Central, most forest land is publicly owned. So, by adding together the data on Europe and the USA, it appears that in the ECE Region there are about 20 million private forest owners with rather small holdings. Many of these are dependent on forest income for their livelihoods, although increasingly forest owners do not live near their forests, do not manage the forest themselves, and have other sources of income.

DOES THE FOREST SECTOR IN THE ECE REGION CONTRIBUTE TO CLIMATE CHANGE MITIGATION?

YES: Forest ecosystems sequester carbon from the atmosphere, and store it in the forest ecosystem over long periods, and, after harvest, in forest products. In addition, the use of products and energy from sustainably managed forests to substitute for non-renewable materials and energy sources contributes to climate change mitigation, although it is difficult to quantify the substitution effect. There is potential to develop all these approaches, although there are tradeoffs between them.

Section 2.1 has presented the stocks and flows of carbon in forest ecosystems. This section addresses the benefits for people in this area, specifically the mitigation of climate change through actions connected to the forest sector.

While sustainable forest management should aim to achieve multiple objectives, mitigation of climate change is becoming an increasingly important management objective. This objective can be achieved by (i) increasing carbon storage in the terrestrial biosphere (soils and biomass)

and in products made from wood, (ii) using products from sustainably managed forests as material (iii) substituting fossil fuels with energy from sustainably managed forests.

CLIMATE CHANGE MITIGATION BY CARBON SEQUESTRATION AND STORAGE IN FORESTS AND WOOD PRODUCTS

Mitigation through changes in forest management has been quantified in many studies and evaluated against the potential effect on other forest functions, including the mitigation effect of substituting fossil fuels with forest biomass. Bearing in mind the other economic functions of forests and forestry, forest management is in principle a mitigation option which is easy to implement and potentially very substantial. This mitigation option has multiple benefits for society and can financially be a free rider on other revenues from the forest as part of regular forest management (Canadell and Raupach, 2008; Jackson and Baker, 2008; Pan et al., 2011; Malmshheimer et al., 2008).

However, in the ECE Region, only the forests of Europe, the USA and small parts of Canada and Russia are actively managed. Large tracts of Canada and Russia are not managed or managed very little, and in some parts of the region, forest cover is rather low. To change forest management in such a way that carbon sequestration would be stimulated is only realistic in those forests which are managed and accessible, and where carbon sequestration goes hand in hand with achieving other goals, such as soil protection or biodiversity conservation, or continuous or enhanced wood and biomass production. Potentially larger gains might also be made (at least temporarily) by trying to reduce emissions from fire or insect attacks in the large areas of unmanaged forests.

But even in the actively managed forests in Europe or the USA very little has changed

in forest management in the last decades to stimulate carbon sequestration. Thus for the ECE Region the balance between sequestration in managed forests and sequestration owing to the natural dynamics in the large tracts of unmanaged forests determines the total area carbon balance.

Another option is afforestation, where there is sufficient land, and growing conditions are satisfactory, especially when the carbon sequestered and stored in the growing trees is used, at harvest, to substitute for non-renewable material and energy.

Options for climate change mitigation must be compared and evaluated in multi-criteria analyses that include other forest values and ecosystem services provided by forest ecosystems and forest management. A good example is biodiversity that will be affected by climate change and changing management practices (Reid, 2006) which may lead to additional disturbance and increased extinction rates of species (Thuiller et al., 2005). Forest management options to increase carbon sequestration include selection of tree species and tree species mixtures, choice of rotation, and silvicultural techniques. Together these comprise a forest management strategy, which has to be specific for local conditions, and which develops a forest which has ample room to adapt to climate change. Mitigation and adaptation should thus be combined. In this way, forest management can contribute to climate change mitigation while maintaining the competitiveness of the forest sector in the ECE Region.

Less is known about carbon storage in harvested wood products, as even estimating the amount of carbon stored in products necessitates quite detailed knowledge about patterns of use, which vary widely between countries and over time. However the main lines of increasing storage of carbon in “harvested

wood products” (the term used in the negotiations on this topic) are clear: use more products based on wood from sustainable sources, favour long-lived products, such as houses, furniture or books, rather than short-lived ones like pallets, newsprint or packaging,²² increase the products’ life in service, and recover and reuse as much wood as possible. Only a few countries have seriously addressed the recovery of wood products, after consumption, for re-use as material or energy. However, their experience shows that it is possible to recover very significant volumes; for instance from demolition waste, or used pallets. For example, about 10 million m³ of wood is quite contaminated with paint, nails etc., is recovered annually in Germany. This material is mostly used as raw material for particle board and as a source of energy.

In principle, forest management aimed at a positive carbon balance should regard the total chain from forest ecosystem to harvesting, wood products, recycling, and bioenergy. These management alternatives can then have a large impact on the total balance; not only of the forest ecosystem, but also of the harvested wood products, and avoided fossil fuel emissions.

Local circumstances should also be taken into account. For instance, a forest in Central Europe with high levels of growing stock per hectare may be vulnerable to accidental carbon emissions (through storm or fire), and measures should be taken to reduce this vulnerability, by reducing stocking levels. This produces a carbon emission in the short term, but wood products are produced, and in the longer term a younger regrowing forest will occur. This is how local circumstances and needs have to be taken into account. There is not one single optimal solution.

The net amount of carbon sequestered has been reported by FAO FRA for all of the ECE regions, and this is one of the few benefits

²² If the short lived products go to landfill, rather than supplying energy, they may store their carbon for long periods. However, the EU and many countries are trying to stop the use of landfills.

for which we have consistent information across the entire ECE Region. Assuming an average credit price of \$10 per metric ton of carbon we can convert net sequestration estimates into an estimated cash value for this net sequestration stream (Table 2.2.8). This simple (and very approximate) calculation provides an estimated total monetary value of forest carbon

sequestration for the ECE Region of 130 billion dollars over the 2000-2010 period, with over half of this value attributed to ECE West. This figure simply represents the total value of carbon under the 10 USD/ton of carbon assumption, and it does not account for management activities and costs, or whether the carbon was actually traded in any markets.

Table 2.2.8

Estimated monetary value of net Carbon sequestration in ECE Region forests, 2000-2010

Source: Annex 3

	Carbon in forest ecosystems (million metric tonnes)					
	2000	2005	2010	2000-2010 net sequestration	2000-2010 net change	Value † \$ Million
ECE East	165,208	165,617	166,855	1,647	1%	16,474
ECE Central	35,238	36,585	37,975	2,737	8%	27,368
ECE South-East	4,211	4,334	4,508	298	7%	2,975
ECE West	180,797	184,743	189,091	8,294	5%	82,940
ECE Region	385,453	391,278	398,429	12,976	3%	129,757

Note: Includes all biomass (live, dead, above and below ground, and soils. It is therefore different from the data on carbon in living biomass presented in section 2.1.

† Estimated at \$10/tonne.

A number of caveats must accompany this estimation. First, forest carbon estimation depends on good forest inventory data covering not just live trees but a number of other ecosystem components, notably forest soils, which are major carbon stocks in many ecosystems, but extremely hard to monitor. Second these estimation techniques are still under development, and it is unlikely that they have been consistently applied across the ECE Region for each reporting period. Third, the \$10 per metric ton credit price is merely a benchmark (albeit a common benchmark) for estimation. It represents approximately the recent price on carbon markets, such

as the ETS, which has been driven down by oversupply of carbon credits and weak demand because of low economic growth, and not the value of carbon in a broader social or ecological context. Actual values have fluctuated broadly over the years and, since cap and trade systems have not been universally instituted, spot prices for credits under a fully implemented trading system may be considerably different than those we have witnessed to date. And finally, even under such a system, credit prices will simply reflect the opportunity cost of avoided emissions and not the actual value of emissions reductions to society.

Another point that needs to be made here is that the net positive sequestration shown in Table 2.2.8 represents a relatively small proportion of the total amount of carbon stocked in ECE Region forests. Should conditions change, the positive sequestration rates could turn negative and forest become an additional source of carbon emissions. Some of these conditions are under our control through forest conservation and management activities. Others, such as insect infestations, drought and fire, may only be partially mitigated through management activity. Moreover, climate change will likely serve to exacerbate these processes. One example is the damage caused by the Mountain Pine Beetle, which was a major factor in changing Canada's forest from a carbon sink to a net source. (Kurz et al. 2008; Stinson et al. 2011)

Finally, it should be noted that, even with net positive sequestration, the effects of forests on climate change are not all beneficial. The interaction between forests and climate is complex and subject to ongoing research (Bonan 2008). Forest influence in reducing albedo is one example where increasing forest cover can exacerbate climate change, by reducing the reflectivity of the earth's surface: this particularly applies to northern regions with extensive winter snow cover, regions which comprise a large proportion of ECE Region forests.

SUBSTITUTING FOR NON-RENEWABLE MATERIALS AND ENERGY SOURCES

An additional contribution forest can make to mitigating climate change lies in the reduction of greenhouse gasses through the substitution of wood-based materials and fuels for non-renewable materials and fuels. Estimating the volume of this substitution is very difficult as it necessitates the construction of hypotheses: if wood based products

or energy were not used, by how much would the use of non-renewable materials and fuels increase? Or, if wood based materials and fuels increase, how much of the increase represents simply additional consumption of wood products, and how much represents substitution for other materials and fuels?

Wood-based energy has long been a common by-product of wood product production processes, and the direct harvest and use of wood for energy, in the form of wood pellets for example, is increasingly common. The assumption here is that wood-based energy is carbon neutral since the released carbon will be re-sequestered as harvested forests grow back. This process, however, is neither immediate nor guaranteed. Moreover, the harvest and use of wood as an industrial-scale feedstock for energy production has important implications for sustainable forest management and the provision of other desired forest characteristics such as biodiversity. As appears from figure 2.2.9, wood energy can be generated at any point of a complex life cycle: the forest, the wood processing industries, primary and secondary, including pulping, where the so-called black liquors supply major energy for the Kraft process, secondary manufacturing and after consumption. Taken together, the 28 countries which responded to the Joint Wood Energy Enquiry in 2013, added to estimates for Canada and Russia, supplied wood-based energy equivalent to over 150 million tonnes of oil equivalent, comprising (for the JWEE countries) 3.3% of total primary energy supply, and 38.4% of renewable energy supply in those countries. Over 40% of wood consumption in those countries was used for energy purposes.

A final way in which forests can contribute to climate change mitigation is through the use of solid-wood products as substitutes for more carbon intensive

products such as steel or concrete. This impact may be larger than the other mitigation strategies, but it is hard to quantify the substitution effect. An estimation of the role of solid-wood products in mitigation would begin with an analysis of production volumes, but subsequent steps would require relatively complex life-cycle analyses for different products, and an estimate of the propensity of these products to substitute for more carbon intensive materials in the market place.

In summary, the ECE Region forest sector makes a significant contribution to climate change mitigation, through sequestration and storage of carbon in forests and products and through substituting for non-renewable materials and energy. The value of the carbon sequestered annually by ECE Region forests is estimated at about \$13 billion. However, there exists a risk that the large stocks of carbon in forests might be emitted to the atmosphere in the future as a result of disturbance processes or other forms of forest loss and degradation.

Figure 2.2.9
Material flow along the process chain of coniferous sawnwood in Germany
 Source: Rüter, 2011

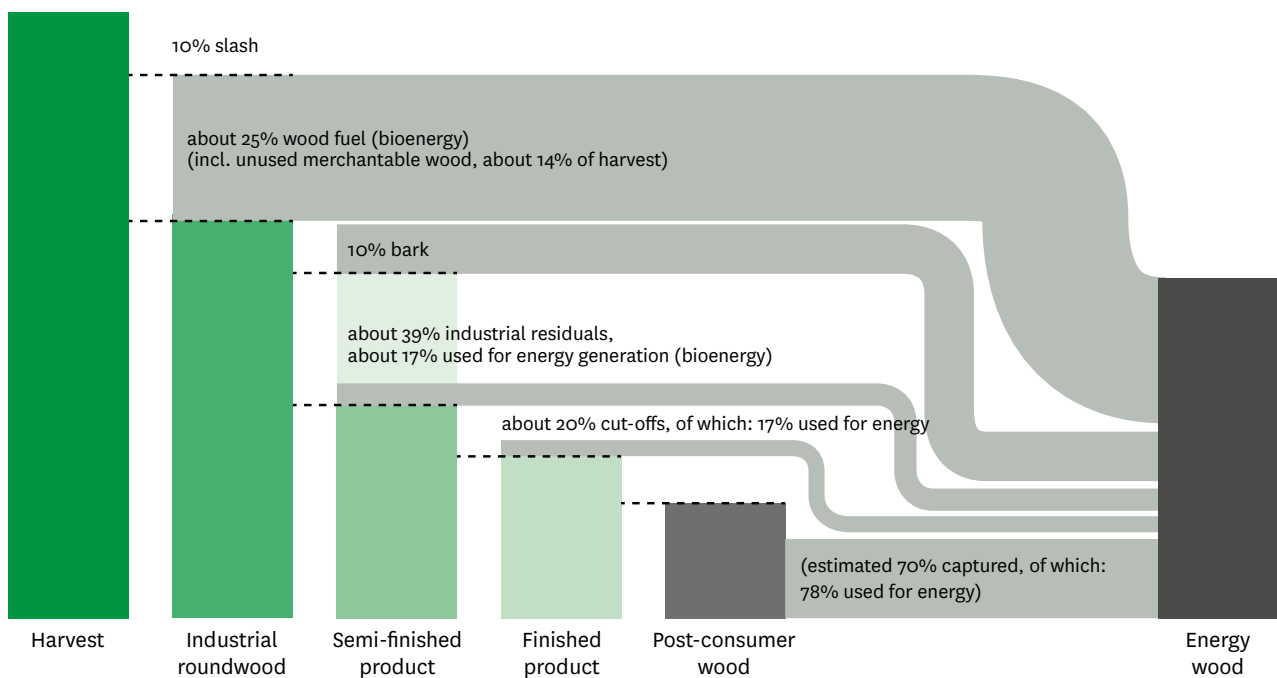


Figure 2.2.9 demonstrates for one product, in one country, the complexity of the material flows, and the great importance of energy as an end use all along the life cycle. It does not show (for reasons of clarity) how many process residues are

themselves used as raw material for other products, such as pulp or particle board. It is one example of wood as a low-waste material, well suited to recovery and recycling, and as a source of renewable energy.

ISSUES ARISING FROM TRENDS FOR GLOBAL OBJECTIVE 2

The preceding sections of this chapter have been largely descriptive. In this section we turn to the primary questions arising from the consideration of Global Objectives on Forests: have forest benefits increased or decreased, and what can be done to increase benefits in the future? Not surprisingly, given the complexity of forest-human systems and the lack of comprehensive data covering many socioeconomic aspects of these systems in the ECE Region, the answers to these questions are neither clear nor unambiguous.

GENERAL OBSERVATIONS

The size and heterogeneity of the ECE Region make data collection, analysis and comparison difficult. The findings of this report need to be tempered by a sensitivity to local and regional conditions. At the same time, however, a number of general conclusions spanning the ECE Region can be derived from the available data, particularly in regard to economic conditions within the forest sector and its dependent constituencies. Conclusions about social and environmental benefits are more elusive and rely primarily on information about the extent of available forests rather than actual measures of value or use. As a result, many of the issues and recommendations for specific benefit areas focus on the need to bolster current data reporting activities and develop new data streams. In addition, the valuation of ecosystem services provided by forests could serve as a basis for capturing these difficult to measure values.

ECONOMIC BENEFITS

Forest sector economic data are generally available, but greater consistency in reporting across the ECE Region is needed. The forest sector will likely occupy a

diminishing share of GDP across the ECE Region owing to broad scale processes of economic development and expansion of new economic sectors. At the same time, it is essential to recognize that this does not imply a moribund economic sector. There are opportunities in the wood products sector for the modernization of production facilities, the development of new products, and the expansion of value added activities. Investment in these opportunities would increase value added in the sector and employment. In determining strategies, the livelihoods of dependent populations should be taken into account.

SOCIAL BENEFITS

Traditional forest sector measures do not address the many social benefits from forests. Use and value measures are difficult and expensive to develop at national or regional scales, but data on forest cover that relate citizens with forests and woodlands (particularly in relation to population centres) are feasible at relatively low cost. If properly constructed, these data would at least provide a first approximation of the ability of forests to provide social benefits. At the same time, it must be recognized that isolated rural populations are often characterized by more intensive use of (and thereby greater per-capita benefits from) forests. In general, the increasing recognition and incorporation of social values into forest planning processes, public or private, is the best way to ensure the ongoing provision of these benefits.

ENVIRONMENTAL BENEFITS

Direct measurements of environmental benefits from forests across broad areas are generally absent, but research is continuously developing ways to model the connection between forest inventory variables and specific benefits (models estimating forest carbon sequestration are an example of this). An additional step will be relating specific benefits to potential

beneficiaries (downstream users of forest watersheds, for example). Once again, measures spatially relating beneficiary populations to forest areas will help in understanding the provision of these benefits. At the regional level, a general description of the extent and health of forests will aid in understanding the level of environmental benefits. Increasing these benefits, however, will rely on specific management activities focused on specific benefits or bundles of benefits. Developing a catalogue of potential benefits for the ECE Region as a whole would aid this process.

FOREST LIVELIHOODS

Endemic rural poverty in many forest areas combined with rapid declines in forest sector employment have resulted in a potential crisis in many forest dependent communities. While forests provide many different opportunities for income generation, the ability of forest development and management activities, by themselves, to counteract rural poverty at regional scales is questionable. However, if used properly, forests can help alleviate poverty at the margin. In order to do this, forest management and policy decisions need to explicitly consider rural livelihoods and transition strategies, especially in areas anticipating declines in forest sector activity. The extent to which this has occurred across the ECE Region is unclear, and a study on forest dependence, revenue distribution and rural poverty would help identify the severity of the problem and potential strategies for addressing it. Specific focus on indigenous peoples and communities would be an important component of this study.

CLIMATE CHANGE MITIGATION

Ensuring forest contributions to climate change mitigation will depend both on adequate monitoring and on developing specific strategies to reduce greenhouse gases through forest management and use. On the monitoring side, more precise carbon modelling of forest ecosystems will provide better estimates of sequestration rates and levels. This will need to be combined with additional research and modelling of other climate forcing processes associated with forests, albedo effects in particular. Ongoing monitoring activities will need to explicitly incorporate disturbance processes (including forest loss to development) to ascertain impacts of disturbance on net sequestration rates. On the management and use side, lifecycle analyses of forest-based carbon sequestration strategies, bioenergy production, and use of long-lived wood products should be used to identify optimal and feasible strategies. In particular, the ability of wood products to substitute for more carbon intensive products needs to be recognized and measured. Carbon credit trading schemes or other carbon pricing mechanisms could enhance the financial basis for these activities, but implementation of such schemes and mechanisms poses significant political challenges in many countries. Political feasibility in combination with optimality might be the best way to evaluate available options for increased climate change mitigation involving forest- and wood-based carbon.

2.3 GLOBAL OBJECTIVE 3:

INCREASE SIGNIFICANTLY THE AREA OF PROTECTED FORESTS WORLDWIDE AND OTHER AREAS OF SUSTAINABLY MANAGED FORESTS, AS WELL AS THE PROPORTION OF FOREST PRODUCTS FROM SUSTAINABLY MANAGED FORESTS

HAS THE AREA OF FORESTS PROTECTED FOR CONSERVATION OF BIODIVERSITY, INCLUDING BY ACTIVE MANAGEMENT, INCREASED OR DECREASED?

STATUS AND TRENDS OF FOREST BIODIVERSITY

Forest biodiversity in the ECE Region varies considerably not only by the geographical location and climatic conditions but also by the historical use of forests, the population density and settlement history, the forest land ownership structure and the fragmentation of forests within the landscape caused by other land use forms. For example, in ECE Central (excluding the Nordic countries), the human influence on the forests is very long and the population density is very high. As a result, the forests are often fragmented in the landscape to patches surrounded by agricultural land and urban areas.

In ECE West and ECE East, especially in Canada and Russia, many forests are located in remote areas far from human settlements and create continuous forest landscapes. These very large continuous forest areas are located in the boreal forest zone, which covers over 60% of the forest area in the whole ECE Region. The boreal forests which total approximately 1 008 million ha, are divided into four areas: Canada (31%), the Russian Federation (60%), USA (Alaska) (4%) and Nordic countries (5%) (Natural Resources Canada, 2005, Finnish Forest Research Institute, 2013 and Mutanen et. al. 2005). The forests in other parts of the ECE Region mostly belong to the temperate vegetation zone.

Two main approaches have been applied to conserve and preserve, or generally to maintain, biodiversity in forests: the creation of a protected area network, and the orientation of forest management outside the specifically protected areas to secure the maintenance of large-scale biodiversity. Different levels of utilization intensity are characterized not only by the existing forest area in the country, but also by changing forests structures and different species communities within the forested areas.

NATURALNESS IN THE FORESTS OF THE ECE REGION

The intensity and history of human interventions in forests can be illustrated by the concept of naturalness. This concept classifies the quality of being natural or the degree of human impact on forests. The degree of naturalness in forests is broken down into three categories (although slightly different approaches have been adopted by different organizations). In the pan-European enquiry, used for 54 of the 56 countries in the region, the three categories are “forest area undisturbed by man”, “semi-natural forests” and “plantations”, while in ECE West the FRA categories are used: “primary forests”, “naturally regenerated forests” and “planted forests”. The differences in the definitions used to report on these indicators have a strong influence on the interpretation of the naturalness, and the resulting data.

Forests undisturbed by man (equivalent to “primary forests”) are forests where the natural development cycle of the forest has been retained or (in exceptional circumstances) restored. Those forests show the characteristics of natural tree species composition, natural age structure, dead wood component and natural regeneration. Undisturbed forests 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 the ecological principles and contribute to the development of forest management methods.

Plantations and planted forests are usually ecosystems of their own. They are established artificially by planting or in some cases seeding, often with non-indigenous or non-local provenances of native tree species, and are intensively managed, usually for the production of wood. Data for plantations, as defined in this way are available for all parts of the ECE Region, except ECE West, where the data refer to “planted forest”, as defined for FRA, which is a broader category. Thus the data are not fully comparable across the region. Semi-natural forests are neither undisturbed by man nor plantations, but display some characteristics of natural ecosystems. They occupy a wide spectrum from forests resembling plantations to forests with very natural processes. In the ECE Region two thirds of the forests are classified as semi-natural (Figure 2.3.1). The highest share of semi natural forests (89%) is in ECE Central. Semi-natural

forests include a broad range of forests with different levels of naturalness and biodiversity.

The area of undisturbed forests in the ECE Region in 2015 was 561 million ha. The largest areas of undisturbed forests can be found in ECE West (43% of the region’s forests) and ECE East (33%). In ECE Central the area of undisturbed forest is only 4.7 million ha (Figure 2.3.1). The three largest forest countries within the ECE Region that have high shares of the undisturbed forests are the Russian Federation (33.5%), Canada (59.3%) and USA (24.4%). In addition, nearly all other wooded land in the Russian Federation is classified as undisturbed by man. In ECE South-East two countries also have a high share of undisturbed forests: Azerbaijan (43%) and Tajikistan (72%) (Figure 2.3.2).

Plantations²³ cover 5.2% (88 million ha) of the forest areas in the ECE Region. In ECE Central the share of plantations of the forest area is 9.7% (17.6 million ha). There are several densely populated countries in ECE Central (e.g. Ireland, United Kingdom, Denmark, Belgium, Portugal), where the main wood resources consist of plantations. In the USA planted forests cover 8.5% of forests (about 26.4 million ha), in Canada 4.5% (15.8 million ha) and in the Russian Federation plantations account for 2.4% (19.8 million ha). Changes between the naturalness classes have been slow during the last 20 years period. However the area of planted forests has slowly increased in ECE Central, West and South-East.

²³ In countries not applying the pan-European definitions, “planted forests”, as explained above.

Figure 2.3.1
Share of different naturalness classes, by region, 2015

Source: Annex 3

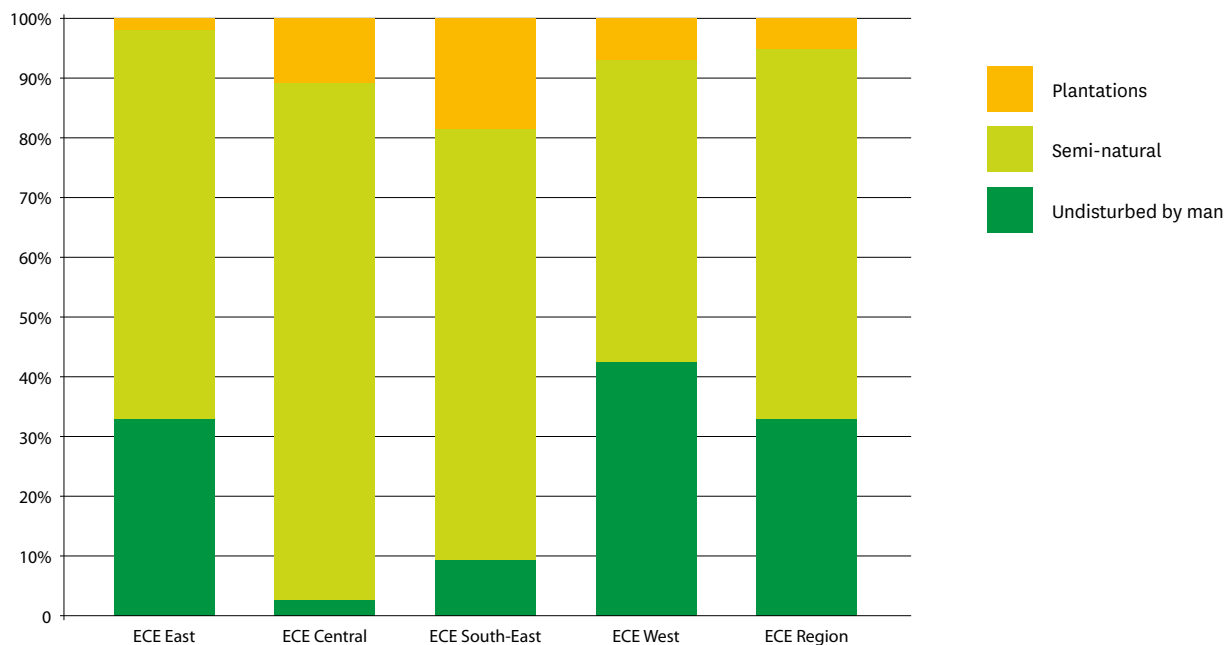
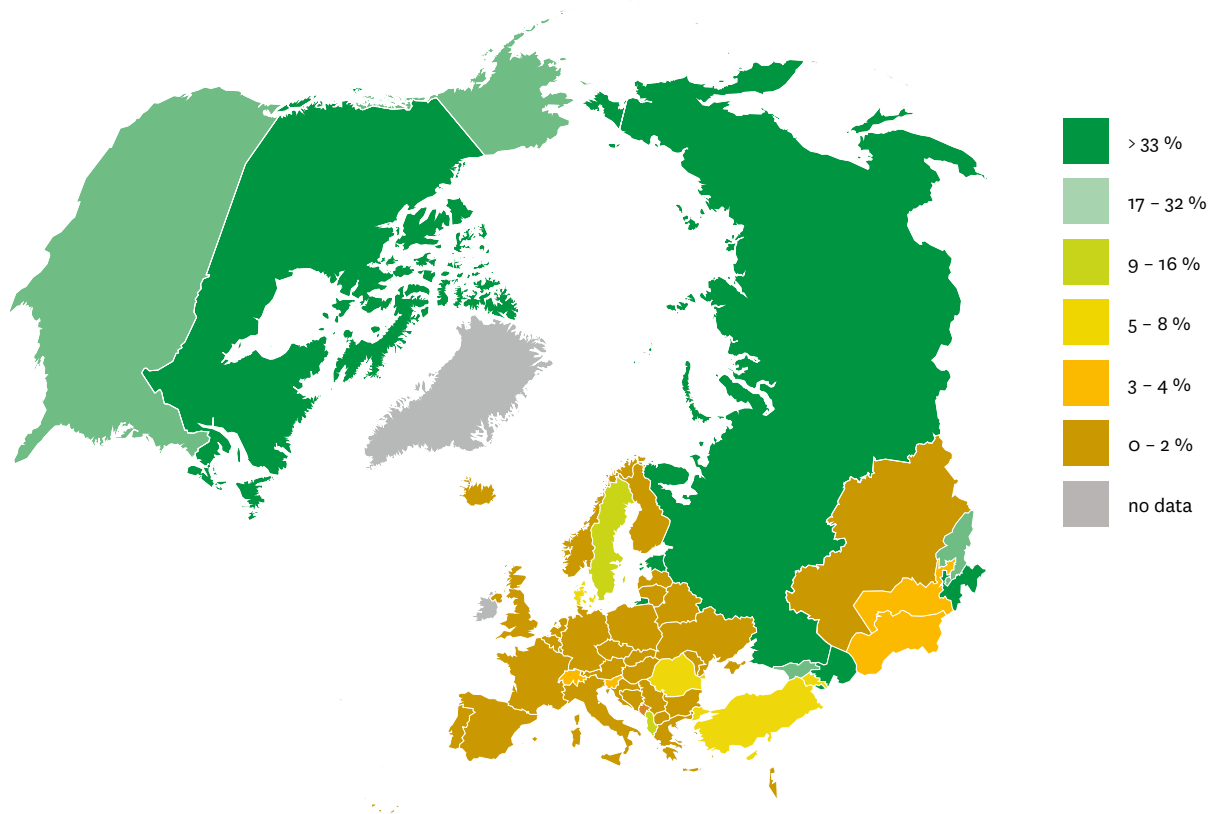


Figure 2.3.2
Share of undisturbed forest in total forest area

Source: Annex 3



Note: For countries not using the pan-European system, the following equivalences are used: primary forest = forest undisturbed by man, other naturally regenerated forest = semi-natural, planted forest = plantations. While differences in definitions do exist, these equivalences make it possible to present the broad picture.

BIODIVERSITY IN MANAGED FORESTS

In most countries within the ECE Region, forest management is based on the principle of multifunctionality. This means that several functions such as wood production, carbon sequestration, recreation, landscape values, use of non-wood products and maintaining biodiversity are practiced simultaneously on the same forest area. The principal goal of the management can vary, depending on the circumstances. Therefore semi-natural forests are not managed for wood production purposes only, and are thus not transformed into single purpose land-use patterns as agricultural land is often managed.

INTEGRATED FOREST MANAGEMENT

The favoured approach at present for biodiversity in managed forests is that targets can best be reached by the integration of biodiversity considerations with wood production, for example through a system of small protected key habitats within the forest management unit. This principle is often included in the forest legislation, or in the forest management plans and recommendations. Biodiversity is taken into account in the integrated management of production forests by leaving decayed wood, large and unusual trees and undisturbed, rare and valuable small key biotopes in forest stands in order to preserve living organisms.

The main principle of this type of management in boreal forests is to mimic the natural forest development cycle including the large scale disturbances such as fires or storms in the forest landscape and stands. In temperate forests for instance in ECE Central the pattern is of small scale disturbance where the small openings for regeneration in the natural forests arise through the death of individual big trees or group of trees. The cause for

that might be storms, insects, snow or other damage which shortens the tree's lifespan.

This principle has been applied in the boreal zone of the Nordic countries since the 1990s. The cutting areas of mature forests are small, mainly some few hectares, and are located in a mosaic-type landscape which includes a variety of stand types and ages. One third of the harvested wood in those countries is supplied through thinning operations.

The concept of "retention forestry" was introduced about 25 years ago in the Pacific Northwest of North America. Retention forestry is mostly associated with large scale clear cutting but is increasingly applied also for selective harvest operations and small size clear cuttings. The main principle of the retention approach is to leave some structures and features that support biodiversity on the stand at harvesting. The retention idea has spread through the world with various modifications depending on the forest conditions and local approaches.

In the temperate zone of the ECE Region, the variety of forest management methods is wider than in the boreal zone due to the smaller management units, larger variety of tree species and forest types, and the dominance of small scale disturbances within the stands and forest areas. The retention principle is applied in this area also through selection cutting without clear fellings of the whole management area.

The low amount of plantations in the ECE Region indicates that the wood resources for industrial use are harvested mainly from semi-natural forests. Plantations are, however, important because wood production in these ecosystems is very intensive, cost effective and target oriented – although some plantations share other objectives than wood

production, including land reclamation or protection against wind. Intensive forest management (planting, genetically improved seedling material, fertilization, timely management measures) with the main goal of wood production can also be promoted on special areas of semi-natural forests, in order to increase wood biomass availability.

The three large countries of the ECE Region, USA, Canada and the Russian Federation, still have very large areas of undisturbed forests; nearly one third of the total forest area. In those countries some parts of the original forest are specified for wood extraction. The management of forests in Canada is based on large scale clear cuttings, but the concept of continuous maintenance of biodiversity

through a retention forest management approach is widely applied. Also in Russia, the new management orientation requires that key biotopes should be preserved and part of the logging residues can be left in the logging areas, instead of the former large scale clear cuttings providing for total clearance of the harvested wood from the area.

In some countries in ECE Central, the government gives financial support to private forest owners who undertake to protect their forest voluntarily as a measure to promote biodiversity. Examples are presented in the Box below. It is evident that in many countries, however, the integrated forest management approach is spreading slowly, while the financial support for biodiversity is limited or lacking.

EXAMPLES OF PROGRAMMES TO SUPPORT PRIVATE OWNERS WHO PROTECT THEIR FOREST VOLUNTARILY

In Finland, a special programme called METSO was introduced at the beginning of the twenty first century. Private forest owners qualify for financial support if they commit themselves through voluntary contracts to maintaining or enhancing valuable natural features.

The forest areas to be included into the METSO programme are evaluated by authorities according to a list of agreed elements and species. Voluntary conservation agreements are made for 10 -20 years. In the case of operations in the forests that are in conflict with the agreement, the authorities can interrupt the agreement, and the forest owner has to return the financial support to the state.

The average size of those areas is about 6.5 ha and by 2011 over 1300 contracts had been established. This is a radical shift away from the designation of protected areas by the authorities – a bottom up approach to improve the network of protected areas, and a continued and enhanced application of integrated close to nature management methods in commercially managed forests.

A similar programme has been initiated recently in Sweden (KOMET). In Austria a programme for voluntary protection of forests in private estates supported by governmental finance has been running since 1990.

HOW TO EVALUATE THE STATUS OF BIODIVERSITY IN MULTIFUNCTIONAL FORESTS?

The status of biodiversity in managed forests can be evaluated through the use of special indicators such as amount of dead wood component, tree species structure, introduced species, genetic resources and threatened forest species. In several countries the proportion of natural regeneration has steadily increased, contributing to preserving local genetic diversity and maintaining the original tree species composition and structure. There is not enough data or only very sparse data, however, for these parameters for the ECE Region. Data is available only for the deadwood component and threatened forest tree species in some areas of ECE from which to draw some conclusions.

The amount of standing and lying deadwood in ECE Central and East forests increased over the last 20 years, in parallel to the introduction of integrated forest management. In 2010, in ECE Central, deadwood in the forest was on average 11.3 m³/ha, and in ECE East 16,8 m³/ha (see Figure 2.3.3). Deadwood in ECE Central is 4-8% of the average volume of wood in forest and in ECE East over 15% (see Figure 2.3.4). The difference in the amount of deadwood between these areas depends very much on the growing conditions, tree species composition and naturalness of the forests. Although the forests in the Russian Federation are mainly boreal, the amount of deadwood is higher than in ECE Central. The difference can be explained by the high share of undisturbed forest in the Russian Federation.

Figure 2.3.3
Average volume of standing and lying deadwood for ECE East and ECE Central, 2000-2010

Source: Annex 3

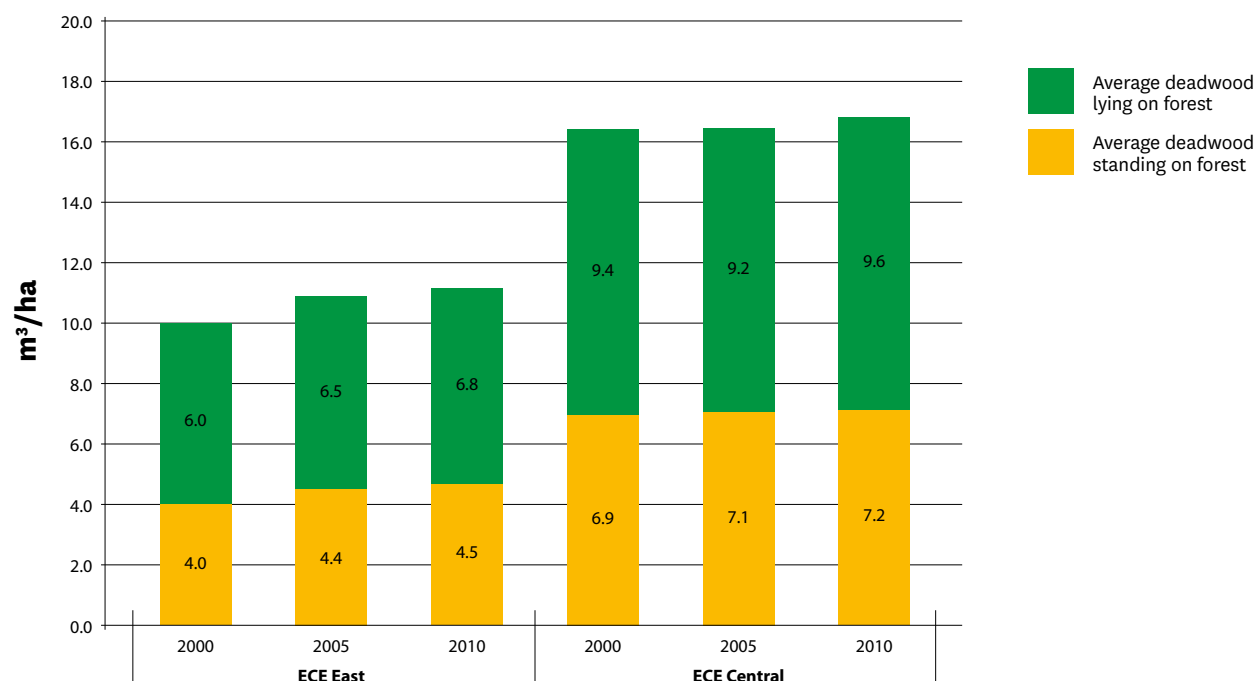
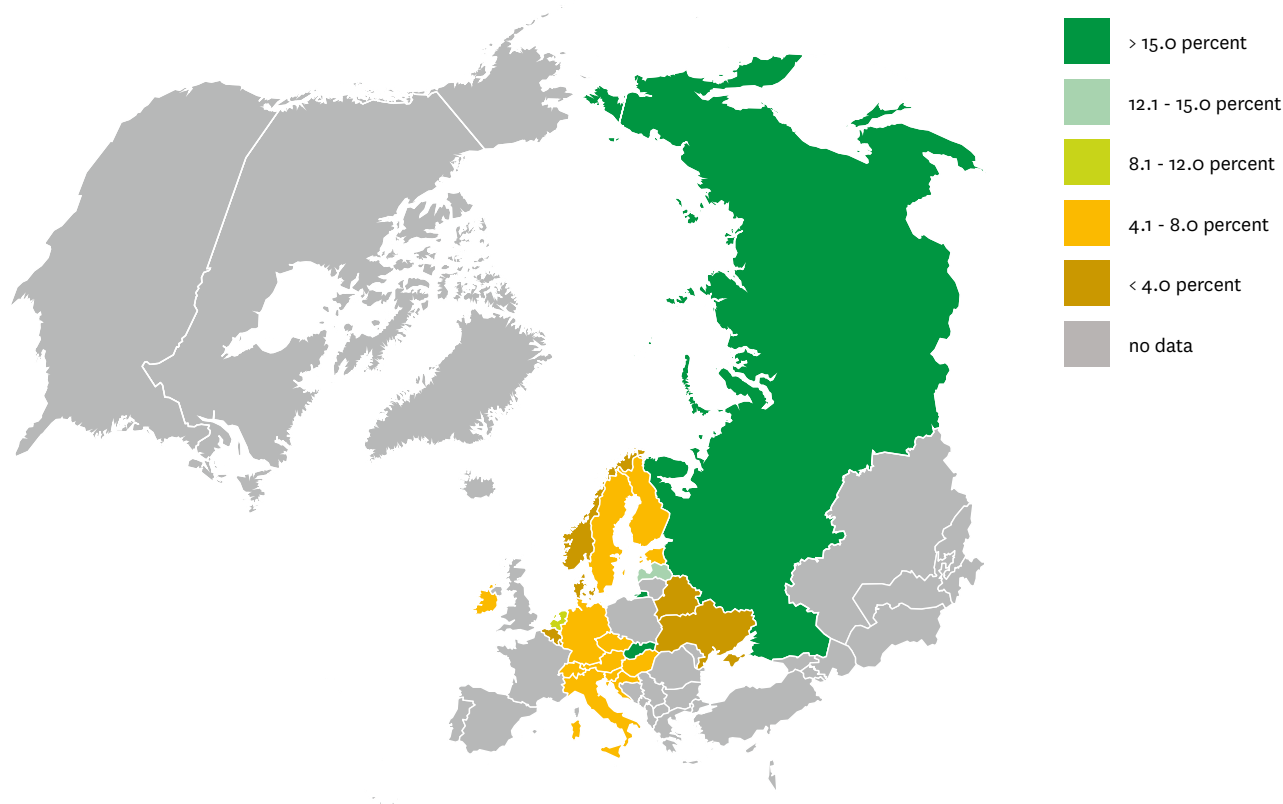


Figure 2.3.4
Standing and lying deadwood as percent of growing stock, 2015

Source: Annex 3



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

A species is listed, according to the IUCN Red List categories, as a threatened species if it falls in the “critically endangered”, “endangered” or “vulnerable” categories. 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 spend most of its

life in a forest as long as it is dependent on forest at some point in its life cycle.

The collection of information on the conservation status of species groups is very demanding, expensive and time consuming. Only a few countries have made a comprehensive analysis of the conservation status of species. In ECE Central and ECE East the number of threatened forest occurring tree species is covered most widely, as well as the mammals, which makes it possible to draw some conclusions. Nevertheless, the interpretation of these figures is sometimes difficult.

The share of threatened tree species in the total forest occurring tree species ranges

from 5 to 10 percent. In some cases, the endangered tree species are growing at the limits of their potential range so, in small countries, it is not surprising that they are endangered. Economically important and abundant tree species for wood production are not found amongst threatened tree species. However, there are some indications that the stock of some tree species important for forestry have suffered significant damage through insects (such as lodgepole pine due to the mountain pine beetle in ECE West or elm, which has practically disappeared from ECE Central).

TRENDS: Over the last 20 years the integrated forest management approach has expanded in the whole ECE Region. This approach includes incorporating and enhancing various forest functions and ecosystem services into commercial forest management at landscape as well as at stand level. The focus in integrated forest management for biodiversity is on the biodiversity components within multifunctional forests. Components such as decaying wood, old trees and protection of key small biotopes which enhance the conservation of biodiversity and contribute to carbon sequestration, are integrated into the management of commercial forests. The benefits for biodiversity can be seen in the increase of the deadwood component in commercially managed semi-natural forests, although there are still challenges, notably for monitoring of threatened forest species.

PROTECTION OF FORESTS FOR CONSERVATION OF BIODIVERSITY

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

Before presenting data, it is necessary to briefly describe the concepts underlying the various systems approaches and datasets. This study uses two concepts: area of protected forest, subdivided into data according to the MCPFE classification and the IUCN classification, and the area “designated” for protection of biodiversity. The former describes a formal status, the latter a management objective. Both are relevant.

There exist various approaches to classify the protected forest areas in strictness of protection, as well as in the classification systems of the protected areas. The most commonly used classification worldwide is the IUCN classification, which has 6 categories for evaluation of the protected areas. IUCN categories have a global approach view, often having in mind vast untouched, continuous and state owned areas with overlapping functions of protection. The IUCN classification has not been especially developed for forest protection.

In the pan-European region, 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, and often located in fragmented landscapes with other land use categories and are protected with various management options and regimes. The MCPFE Assessment Guidelines appear stricter than IUCN classification in terms of legal basis of protection, of separating the protection functions and strictness, as well as of focusing on the statistical and reporting purposes of the forest areas especially.

Within the EU countries there is also Natura 2000, an essential conservation network, which focuses on the conservation of habitats and species. It is not a classification system per se and

does not exclusively focus on protected forest areas, but also includes areas with a multi-purpose use of forests and other ecosystems.

According to the MCPFE Assessment Guidelines “Protected forest and other wooded land” should comply with the following general principles:

- Existence of legal basis (law or decree; a forest management plan is not enough)
- Long term commitment (minimum 20 years)
- Explicit designation for the protection of biodiversity, landscapes and specific natural elements or protective functions of forest and other wooded land

Only forest areas with the goal of biodiversity protection have been included in this survey. However, in addition, large areas of forests in ECE Region have been designated as protective forest areas, for protection against erosion, avalanches and for maintenance of ground waters or other ecosystem services. Due to the restrictions of management, these protective forests also make an important contribution to the maintenance of biodiversity.

“Forest area within protected areas” means forest area within formally established protected areas, independently of the purpose for which the protected areas were established. The worldwide IUCN Categories I – IV are included under this definition, but not the IUCN Categories V – VI, which allow for more active management and

multiple management objectives. MCPFE Classification for biodiversity protection applies the three categories: “no active intervention”, “minimum intervention” and “conservation through active management”.

The IUCN categories have been applied in ECE West, and partially also in ECE South -East. In ECE Central the MCPFE classification has been used for data collection including three categories. In ECE East, MCPFE categories as well as the IUCN classification are applied. In the Russian Federation, nature reserves have a long tradition and they are the most strictly protected nature conservation areas. National Parks are relatively new in the Russian Federation, as the oldest was established in 1983.

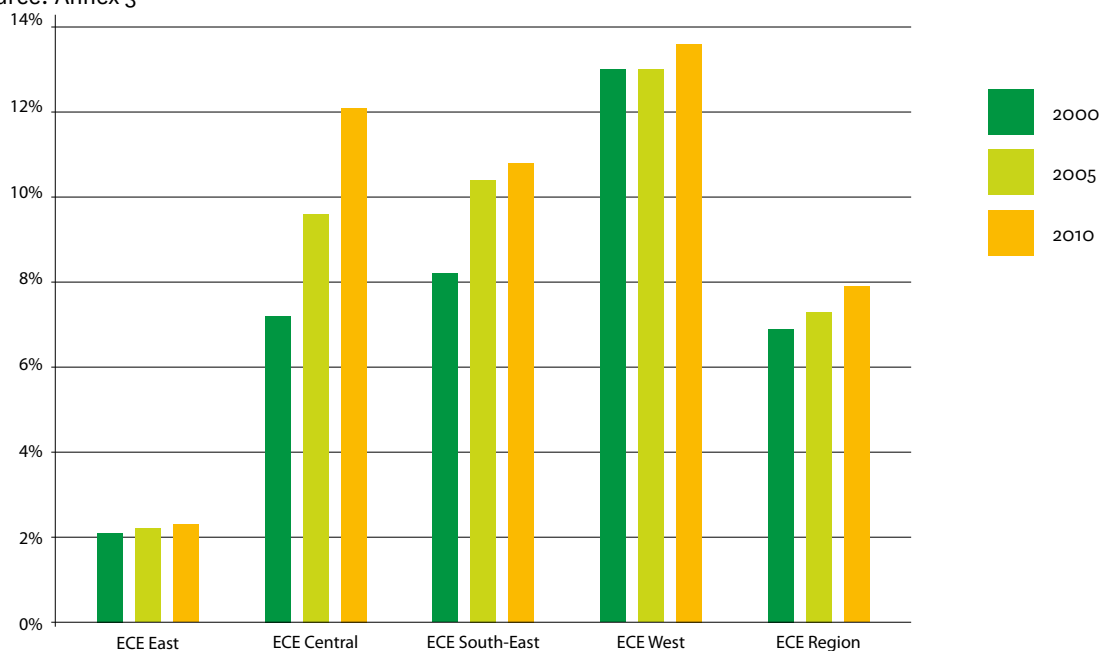
“Forest designation for biodiversity” means forest area designated primarily for conservation of biological diversity. It includes but is not limited to areas designated for biodiversity conservation within the protected areas. The difference between the two above definitions means that area of protected forests is larger according to the definition of “designation for biodiversity”.

The “forest designation - conservation of biodiversity on forest area” (Figure 2.3.5) indicates that 8% (132 million ha) of forests in the ECE Region are designated for biodiversity. This area includes the strictly protected areas as well as those actively managed for biodiversity. The highest share of those areas is in ECE West, where as much as 14% (88 million ha) has been designated for biodiversity.

Figure 2.3.5

Percentage of forest designation - conservation of biodiversity on forest area, 2000-2010

Source: Annex 3



In the other regions of ECE, the forest areas for biodiversity designation are very close to the same as area of forests within the protected areas. In ECE Central the share of forests designated for biodiversity is 12%, in ECE East 2% and in ECE South-East 11%. In ECE Central, where the forests are very fragmented due to the long history of utilization and high population density, only about 1% of the protected forest areas are strictly protected as the main goal of biodiversity without any human activities.

The definition used might be interpreted differently especially in the Russian Federation, where the reported share of protected forests is very low (58 million ha, 2.7% of the forest area) in comparison with the rest of the ECE Region. However, the reality is more complex, when all levels of protection are taken into consideration:

there are about 12 thousand protected areas of different levels and categories, a total area of 207.3 million ha. In this system there are 204 federal protected areas (Nature protected areas in the Russian Federation, 2015; Nature protected areas of Russia, 2015) including 102 state nature reserves, 42 national parks and 70 state nature reserves of federal significance, which together cover about 58 million ha (2.7%) of the total territory of the Russian Federation, while protected areas at all levels take up to 10% of the country. The total area of protected areas of federal significance (207.3 million ha) include all protected areas: marine, steppe, tundra, mountain, city, etc. However, the area of the protected forest land is 26.5 million hectares, of which 17.7 million hectares is covered by forest. The reported figures do not include protected areas of regional and local significance.

In the ECE Region the “forest area within protected areas” was in 2010 100 million ha, or 5.9% of forest area. The share of protected forests is highest in ECE Central (12.7%, 23 million ha). The share of protected forest areas is lower in ECE West (8.7 %) but the area is still high with 58 million ha. In ECE East and South East the percentages of protected forests are lower: 2.3% (19 million ha) for East and 5.4% (1.5 million ha) for South East.

In ECE Central the available statistics indicate that the Natura 2000 forest areas in the countries are in most cases larger than the protected forest areas with the management goal of conservation of biodiversity. This is due to the fact that the Natura 2000 network includes other forest areas that are not under strict protection in addition to those which are legally designated and delineated as protected forests. Forests that are part of the Natura 2000 network can be managed with usual sustainable forest management practices provided that the favourable conservation status of the Natura 2000 sites is guaranteed.

TRENDS: The area of forests protected for biodiversity has increased continually over the 20 year period in the whole ECE Region, as well as in the regions. In 2010 about 11% of the forest area is designated for protection of biodiversity. This area includes the strictly protected areas as well as those with active management for maintenance of biodiversity. In ECE Central the forest areas are well studied, and the most important and vulnerable forests are already protected. However, there exist some rare forest ecosystem types which need additional care and protection, for example floodplain forests²⁴ and beech forests²⁵ in ECE Central and ECE West. Shortage of finance limits the possibilities to increase the protected areas in all the regions of ECE area.

SUMMARY

The integrated forest management approach has expanded in the whole ECE Region during the 20 years. When this approach is applied to biodiversity conservation, it includes the protection of biodiversity components within multifunctional forests at landscape as well as at stand level. The benefits for biodiversity can be seen in the increase of the deadwood component in commercially managed semi-natural forests.

In 2015 about 12% of the forest area is designated for protection of biodiversity. This area includes the strictly protected areas as well as the active management for biodiversity conservation. The area of protected forests for biodiversity has increased continually during the 20 years period in the whole ECE Region.

In many ECE countries the international commitments on biodiversity, notably the Aichi targets, are being integrated into national legislation and policies but implementation is challenging and much remains to be done in some countries. For example, monitoring systems for threatened forest species are not yet adequate in many countries. New potential for large scale protected forest areas can be found in ECE West and East, where still large areas of undisturbed forests exist far from human settlements. In ECE Central the forest areas are well studied, and the most important and vulnerable forests are already protected. However, there exist some rare forest ecosystem types which need additional care, and protection.

Financial support is a necessary precondition in all parts of the ECE region to establish new protected areas including voluntary protection by private forest owners and to develop and strengthen the integrated forest management methods for increasing biodiversity in commercial forests.

²⁴ Floodplain Forests in Europe. Emil Klimo and Herbert Hager. European Forest Institute, Report 10, 2001, Leiden, the Netherlands.

²⁵ Most are considered High Nature Value Forests (EEA Technical report 13/2014 EEA Copenhagen).

HAS THE SHARE OF CONSUMPTION OF PRODUCTS FROM SUSTAINABLY MANAGED FORESTS INCREASED?

TRENDS IN POTENTIAL SUPPLY AND CHAIN OF CUSTODY CERTIFICATES

There is no specific quantified information available on consumption of products from sustainably managed forests due to lack of a system to collect data and report on production and trade of forest products from sustainable and other sources. Ad hoc market studies have been carried out in some ECE countries. They suggest that the certified market is growing but are not adequate to establish trends. Therefore, two proxies are here used to identify trends, both referring to supply: (i) estimated supply of roundwood from forests which have been certified as sustainable and (ii) the number of chain-of-custody (COC) certificates of suppliers issued under forest certification schemes.

The estimated supply of certified forest products in the ECE Region has increased

relatively rapidly, by almost 30 per cent in the six-year period of 2007 to 2013 (Table 2.3.1). The expansion has been largest in ECE Central but the fastest relative growth was recorded in ECE East which however still accounts for only a minor share of the region's total certified timber supply. The main volume is almost equally shared between ECE-West and ECE Central. The increase in the potential supply was calculated based on the change in SFM certified area.

In spite of the relatively strong demand for certified wood in some market segments, not all certified roundwood ends up sold as sustainable with a label. The processing industry or trade intermediaries in the supply chain may have no need to do so or the chain-of-custody has not been certified to prove the product's origin.

Table 2.3.1

Estimated supply of industrial roundwood from certified forests in the ECE Region, 2007-2013

Source: Calculated based on UNECE/FAO Forest Products Annual Market Review 2008-2009 and 2012-2013

Estimated supply of wood from certified forests				
	2007 million m ³	2013 million m ³	Change %	Share, 2013 %
ECE West	210.1	244.2	16.2	49.8
ECE Central	166.4	236.1	41.9	48.1
ECE East	3.6	10.2	183.3	2.1
Total	380.1	490.5	29.0	100.0

Note: Estimated supply has been calculated based on the subregions' annual roundwood production from "forests available for wood supply" which is multiplied by the percentage of the subregions' certified forest area. There is no significant estimated wood supply from certified forests in ECE South East.

The number of COC certificates in the ECE Region has been increasing even more rapidly than the potential supply (Table 2.3.2).²⁶ In 2014, about 27,600 valid certificates were issued which was 3.5 times more than in 2006. In spite of this positive trend, there is cause for concern due to much slower development of certified supplies both in the ECE Region and sources of imports outside the region (see section 2.1.5). A number of market actors had two certificates (PEFC and FSC) and there is therefore an element of double-counting.

Four-fifths of the region's certificates were found in ECE Central, one sixth in ECE West and the remaining two per cent in ECE South-East (Figure 2.3.6). Two thirds of the total number of COC certificates were issued in seven countries (Germany, the UK, the USA, France, Italy, the Netherlands and Spain) indicating where the market pressure for sustainably produced wood and products made thereof has been

strongest. In these countries also the number of COC certificates has increased in absolute terms more than in the other countries of the region. Italy and Spain have presently more than 10 times as many COC certificates than eight years earlier; an indicator of how the trade and industry can adapt their supply management to meet market requirements for traceability of their products (Figure 2.3.7).

In the ECE West COC certification developed in the past at a much slower pace than in ECE Central; but trade and industry have recently made a clear move towards demonstrating the traceability of their products to buyers through this instrument. Both in the USA and Canada the number of COC certificates increased five-fold between 2006 and 2014. The situation is quite different in ECE East and South-East where COC certifications have been made in only five countries. Practically all the certificates are in Russia, Turkey and Belarus.

Table 2.3.2
Number of chain-of-custody certificates in the ECE Region 2014
Source: Annex 3

	chain-of-custody certificates			
	2006 number	2014 number	Change %	Share in 2014 %
ECE West	695	4,475	544	15.8
ECE Central	5,463	22,601	325	82.2
ECE East and South-East	35	548	1,466	1.9
Total	6,202	28,274	346	100.0

²⁶ Part of the imported forest products have also been certified, including COC, but their share cannot be reliably estimated.

Figure 2.3.6
Chain-of-custody certificates (FSC and PEFC), by region
 Source: Annex 3

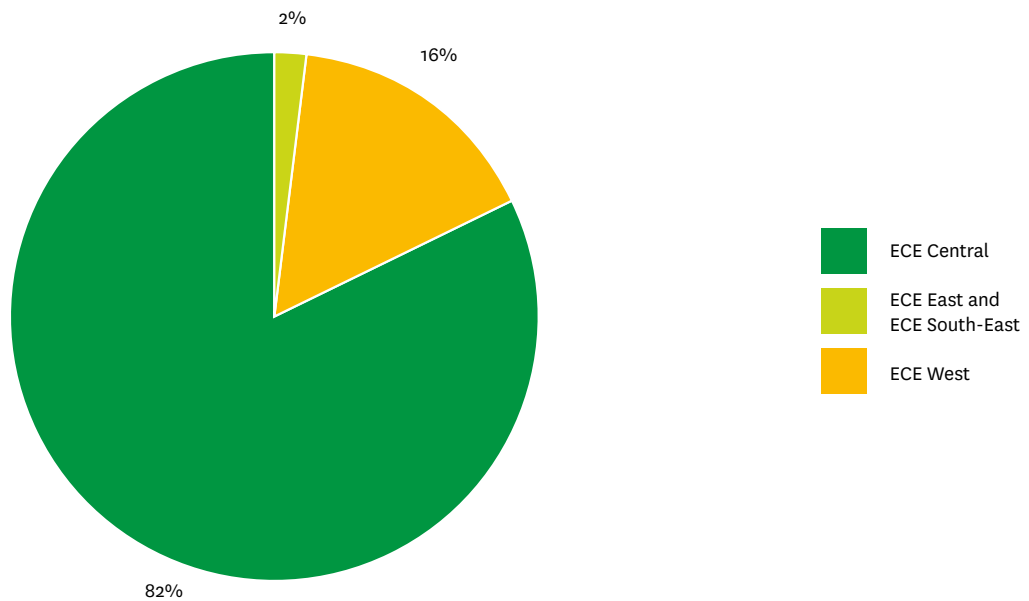
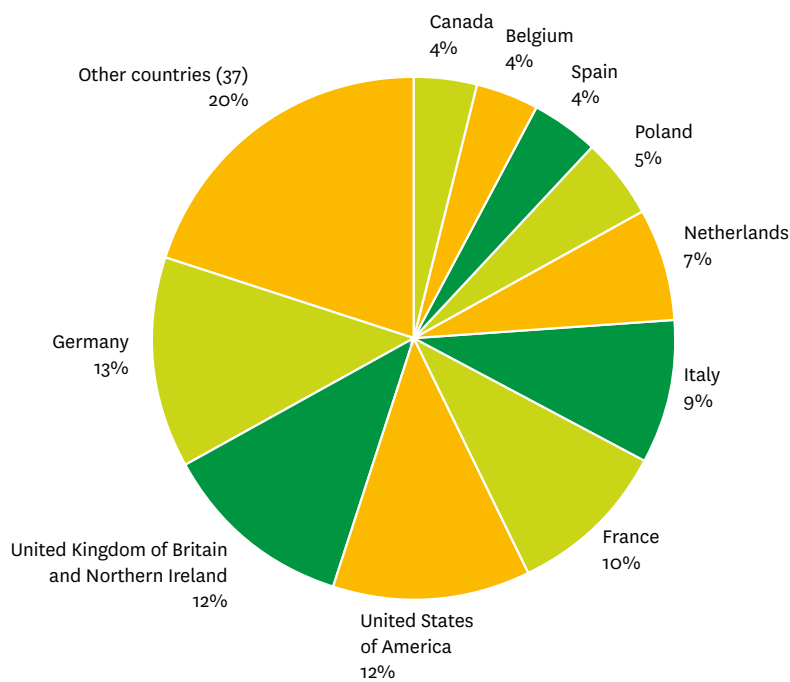


Figure 2.3.7
Chain-of-custody certificates, by country
 Source: Annex 3



The two proxies above indicate that forest product suppliers in the ECE Region are under increasing pressure to demonstrate that their products originate from sustainably managed and legally harvested forests. The trend is to be able to respond to market requirements and trade initiatives both in the public and private sectors. Both raw material suppliers and the supply chain have taken significant measures towards promoting sustainable production and consumption.

INITIATIVES TO PROMOTE SUSTAINABLE PRODUCTION AND CONSUMPTION OF FOREST PRODUCTS

In many ECE Central and ECE West countries, the public sector has been active in promoting the consumption of wood as an environmentally friendly consumption material through supporting promotional campaigns and regulations on public construction projects. Promotion of the use of recycled materials is part of some countries' efforts towards sustainable consumption of wood-based materials. Increasing attention is now paid to recyclability of products also in the bio-economy sectors like forestry when moving towards sustainable consumption and production.

National level procurement policies have been implemented in ten ECE countries²⁷ and the EU which have specified legal and sustainable sources for wood and paper products to be used in public purchasing and projects financed by the public sector.²⁸ In addition, many local governments have also specified their own requirements for sustainability which have often been more specific or stricter than those of the national policies. A recent review suggests that the active development of national level procurement policies has somewhat slowed down since 2008, apparently due to various difficulties in implementation (Martin and Baharuddin, 2013).

Public procurement policies specify that wood products used should come from sustainably managed forests, usually supported by a system of third party verification, and tend to define the requirements for acceptable auditing and certification systems.

Trade measures have been applied by the European Union which promulgated a Timber Regulation (EUTR) in 2013 making it illegal to place illegally harvested timber and products derived from such timber on the market for the first time. The Regulation also requires EU operators to exercise due diligence for risk assessment and mitigation to ensure that such timber and products do not enter the EU market, be it produced inside the Union or imported from outside. The instrument was part of the implementation of the EU FLEGT Action Plan (European Commission, 2003) which also includes establishing Voluntary Partnership Agreements (VPA) with those developing countries that wish to export to the EU. By 2013, six developing countries were at the stage of implementing a VPA while nine others had entered the negotiation process. Exporting countries are in the process of establishing legality assurance systems (product tracking and verification) in their policies and administrative procedures while the EUTR requirements are also being incorporated in the supply chains within EU countries.

The United States amended the Lacey Act already in 2008 making it unlawful for any person to import, export, transport, sell, receive, acquire, or purchase in interstate or foreign commerce any plant taken, possessed, transported, or sold in violation of any law or regulation of any state or any foreign law, that protects plants or that regulates taking or exporting plants and plants products in certain situations. As a result import declarations have to be more specific than in the past and traders and other members of the supply chain

²⁷ Austria, Belgium, Denmark, Finland, France, Germany, Netherlands, Norway, Switzerland, and the United Kingdom. Italy has a relevant policy/law.

²⁸ EU Standing Forestry Committee, 2010.

are expected to exercise “due care” in determining whether products were legally harvested, processed and traded.

Legality has been perceived as the first step towards sustainability in policies targeted at market transformation in forest products. This phasing recognizes difficulties that developing countries, small-scale producers, community forest enterprises and other disadvantaged producers have in achieving sustainability in their operations.

Internationally applicable agreed principles and criteria for sustainably produced solid biofuels, like wood, do not exist as yet in the ECE Region; but there is a formal commitment to their establishment. To fill the vacuum, a wide range of sustainability initiatives has been developed, which may create confusion among market participants and result in cost increases for production and trade. The European Commission is expected to come forward with a proposal on harmonized sustainability criteria for solid biomass for power generation, heating and cooling. As the EU is the largest international market for solid biomass, these requirements will have implications beyond the EU member States and may also represent a risk of increased costs if the criteria cannot be integrated in the certification requirements for SFM.

PRIVATE SECTOR INITIATIVES

Private sector initiatives to promote sustainable consumption and trade in legally and sustainably produced wood and products have been implemented in parallel to public sector measures. They continue to play an increasing role in the markets and five main types have been identified (Dam and Savenije, 2011).

Certification schemes are private sector instruments that include standard setting for sustainability in forest management,

third-party auditing of forest management and chain-of-custody, as well as product labeling. Two international schemes (Forest Stewardship Council as a global integrated system and the Programme for Endorsement of Forest Certification as the international framework for recognition of national systems) have been broadly implemented in the ECE Region. (see section 2.1.3.). These schemes have also been important for the public sector as they are used as a reference in public policies that specify sustainability of forest management and legality of products placed on the market.

Green building initiatives cover legally and sustainably harvested wood products in their standards and building code. Flagship examples of such programmes are the International Green Construction Code and the Leadership in Energy and Environmental Design (LEED) Green Building Certification Program in the United States, and the Building Research Establishment Environmental Assessment Method (BREEAM) with its country-specific schemes in seven European countries. Passivhaus, an energy performance standard for buildings in Germany is also used in other countries. These initiatives are being implemented in many ECE countries to promote the use of environmentally friendly materials: increasingly they address not only material performance but also environmental performance, including embodied environmental impacts created by the life cycle of the structure and its components. With regard to wood products, the initiatives tend to rely on forest certification systems in the compliance assessment of their requirements. Another type of initiative is promotion of low-energy intensive housing with the target to make built space as self-sufficient as possible in the use of energy. Various programme requirements for building materials and products used can have positive or negative impact consequences for use of wood (UNECE/FAO, 2013).

Another tool to promote environmental sustainability in the construction products industry, **environmental product declarations**, are being promoted in the EU (ECO Platform) and the United States (American Wood Council).

In the ECE Region there are **private procurement initiatives** by companies which have wanted to demonstrate responsibility in their purchasing of raw material and products to their customers and consumers. As part of their commitments to continuous improvement and social responsibility, a large number of corporations both in the forest products industries and buyer sectors have established their own policies related to products from SFM. These commitments have in some cases pioneered the development of forest certification and green public procurement. In other cases they have been reactive to market signals.

Trade associations in the wood and paper industries have also been active in promoting codes of conduct which are aimed at communicating responsible performance of their members in procuring raw materials and products from sustainably managed forests. At least 14 international and national industry and trade associations in the ECE countries have established **codes of conducts** or similar commitments in ECE West and ECE Central. (Simula, 2010)

Assessment of the ECE Region's progress towards promoting consumption of products from sustainably managed forests

It is difficult to establish a direct link between the third global objective and public and private sector initiatives to promote consumption of wood and products made thereof.

The ECE Region trade in forest products has been significantly influenced by market developments, particularly the recession

since 2008. The financial crisis has led to major changes in supply chains that had already started before the recession. An important element of these changes has been relocation of processing industries to emerging countries. The difficult market situation has probably slowed down the public and private initiatives targeted at promotion of sustainable consumption of wood.

Even though public procurement may only occupy up to 10-15% of the total wood products demand, there are likely to be spillover effects: suppliers will rationalize their complete logistic and information systems to be in conformity with requirements for public procurement. This is also observed in the case of responsible purchasing policies of many corporate buyers of forest products. Therefore, public and private procurement policies are a powerful driver to promote sustainable consumption of forest products.

A key question to assess the impact on sustainable production and consumption of the private and public sector measures related to sustainability requirements of wood and products made thereof is how these measures have influenced substitution between materials. The available information does not allow any definitive answer to this question. The requirements for verification and certification of legal compliance or conformity to high sustainability standards in raw material sources are not the same for wood-based products as for other construction and packaging materials. As a result, the impact on materials competition is more likely to limit than to promote the use of wood products as their purchasing is much more cumbersome than in the case of steel, plastics or cement. Another limitation is the analytical tools to measure the environmental impacts of alternative building materials. Although such tools exist for building materials, paper and

paperboard (Life Cycle Assessment), there are problems of standardizing scope and approach to demonstrate the lower environmental impact, over the whole life cycle, of wood-based materials.

Inadequate reciprocity and lack of respect among supporters of alternative internationally recognized certification schemes have limited their impact on the ground in promoting SFM and sustainable

consumption of forest products. This is linked to proliferation of subtle differences in procurement policies and certification systems which tend to create confusion among producers, buyers and consumers slowing down progress in implementation. On the other hand, it has become evident that without alternative certification schemes the progress in implementing SFM certification would have been much slower than at present.

2.4 GLOBAL OBJECTIVE 4:

REVERSE THE DECLINE IN OFFICIAL DEVELOPMENT ASSISTANCE FOR SUSTAINABLE FOREST MANAGEMENT AND MOBILIZE SIGNIFICANTLY INCREASED, NEW AND ADDITIONAL FINANCIAL RESOURCES FROM ALL SOURCES FOR THE IMPLEMENTATION OF SUSTAINABLE FOREST MANAGEMENT

Forest financing sources have been typically classified into public and private, national and international. Domestic public funding may come from general government revenue and revenue from state-owned forests. Private sources consist of forest owners, communities, forest industry, financial institutions and individual investors, philanthropic funds and donors, as well as NGOs of various types (environmental, social, religious, etc.). In the case of many NGOs, funds are raised from bilateral and multilateral organizations, philanthropic foundations, individual donations, and other sources. International public sources include bilateral aid agencies and multilateral financing institutions. International private sources are diversified, consisting of institutional and individual investors, forest industry, as well as various NGOs and other civil society organizations (CSOs).

The available information on the financial flows to SFM is limited as systematic statistical data exist only in the case of official development assistance (ODA).

The main problem is that forests or SFM are rarely separated in aggregate financial statistics. Funding is often attached in rural development or conservation programmes and projects and the forest component cannot be separated. Therefore, significant amounts of financial resources for SFM are recorded under agriculture, rural development, biodiversity conservation, combating land degradation and, more recently, under climate change.²⁹

WHAT ARE THE TRENDS FOR OFFICIAL DEVELOPMENT ASSISTANCE FOR SUSTAINABLE FOREST MANAGEMENT?

The Development Assistance Committee (DAC) of OECD systematically collects statistical data on ODA from member countries by sectors and forestry is identified as one of these sectors. However some problems arise about the classification of the funds reported: part of the official development assistance to sustainable forest management is reported under “Rio Markers”, (i.e. biodiversity, land degradation or climate

²⁹ Simula (2008).

change) as a “principal” objective of funding. In some of these cases forestry may have been identified as an additional “significant” objective, although it is not classified as “forestry ODA”. The following review refers to forestry ODA which, for

the reason given above, may represent only about two thirds of the total ODA to forests.³⁰ As annual data tends to vary extensively the analysis is based on three-year averages.³¹ The information is summarised below.

Table 2.4.1

Total forestry ODA from the ECE countries

Source: Calculated on the basis of OECD/DAC data base

Forestry ODA from the ECE countries							
	2002-2004	2005-2007	Change	2008-2010	Change	2011-2012	Change
	\$ million / year	\$ million / year	%	\$ million / year	%	\$ million / year	%
ECE Central	155.1	163.3	5.3	524.7	221.3	918.2	75.0
ECE West	11.3	17.6	55.7	12.1	-31.4	67.9	462.4
Total	166.4	180.9	8.7	536.8	196.7	986.2	83.7

The total annual bilateral forestry ODA from the ECE countries averaged \$986 million in 2011-2012. This is more than five times the volume in 2005-2007 and 84 per cent more than was provided in 2008-2010 (Table 2.4.1; Figure 2.4.1). In 2009-2012, the

ECE countries represented 75-80% of the total reported bilateral forestry ODA. The reporting countries (members of the OECD Development Assistance Committee) may be assumed to account for most of the ODA in the world.

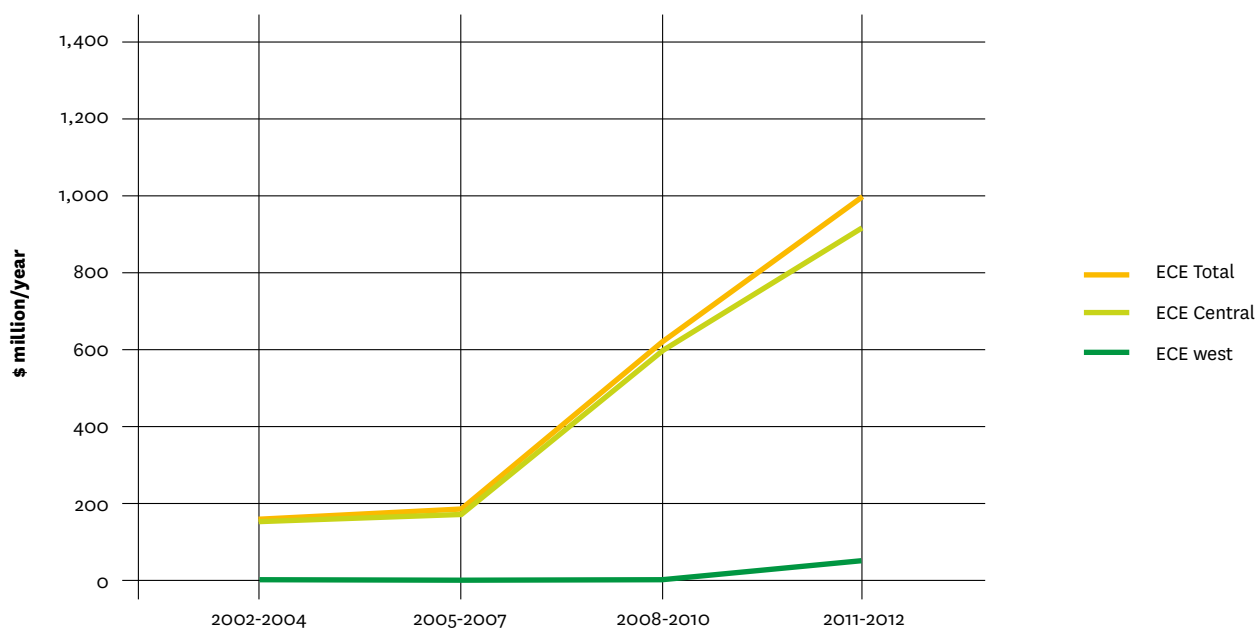
³⁰ A detailed examination on the issue involving project level analysis of individual donor data was made for 2005-2007 which suggested that the total ODA to forests was \$1,910 million (Simula, 2008) while the respective OECD DAC data on forestry ODA was \$859 million (CPF, 2012) which indicates that a significant part of support to forests was reported under the Rio Markers. Another reason for the difference was the fact that the 2008 study also included a detailed analysis of multilateral sources, many of which are not reported in the OECD/DAC statistics for reasons that are not known.

³¹ The latest available (end July 2014) year is 2012 and therefore the latest average is calculated for two years only (2011-2012).

Figure 2.4.1

Total forestry ODA from ECE countries, by region

Source: Table 2.4.1



The available data refers to bilateral ODA only and does not include all the funding provided by the ECE countries through multilateral development financing institutions (although funding by the EU is included) as well as through intergovernmental and regional organizations.³² In 2005-2007 bilateral funding represented 58% of the total forestry ODA and the rest was provided through multilateral channels.³³ The present overall pattern between bilateral and multilateral funding is assumed to be probably largely similar in the ECE countries now as it was in 2005-2007.

There has been a strong increasing trend in the ECE forestry ODA flows, particularly after 2007, as was called for by the fourth global objective (Figure 2.4.1). As the total ODA flows have also been increasing since 2007³⁴, it can be assumed that most of the

increase in forestry ODA has been “new and additional”. The trend demonstrates that the ECE countries as a whole have been instrumental in contributing to achieving the fourth global objective as regards ODA (cf. CPF 2012). There is, however, a caveat in this important finding, as in 2012 forestry ODA dropped by about 23% compared to the previous year partly due to the financial and economic crisis in the region.³⁵ The 2012 level of forestry ODA was, however, still significantly higher than in 2007.

The sources and composition of ODA have also changed over time. More than 90% of the region’s total has been contributed by ECE Central and the rest came from the USA and Canada (Table 2.4.1).³⁶ While in 2005-2007 the largest bilateral donors (in descending order of volume of ODA for forestry) were Germany, the Netherlands, Finland, the United States,

³² These include, among others, the World Bank, regional development banks, the Global Environment Facility, FAO, and ITTO.

³³ Simula, *ibid.* Multilateral and regional development banks also raise a minor part of their funding from other than bilateral donor sources.

³⁴ <http://stats.oecd.org/Index.aspx?DataSetCode=TABLE1>

³⁵ The ECE forestry ODA was \$1,116.7 million in 2011 which dropped to \$855.6 million in 2012 (OECD data base).

³⁶ No data on forestry ODA was reported by the ECE South-East countries.

the United Kingdom and Sweden, in 2011-12 the largest donor was Norway followed by the EU institutions, Germany, Finland, the UK, Canada, France, the Netherlands, the United States, Switzerland and Spain (Figure 2.4.2). Norway became the biggest individual source in 2008-2010, thanks to the launching of its international forest-climate initiative. The Country accounted for 36 per cent of the ECE total in 2011-2012, compared to 2.8 per cent in 2005-2007. However, other countries besides Norway have also expanded their funding. Some countries have demonstrated systematic significant commitments to forestry over time (e.g., Germany, Finland,

the UK, France, the Netherlands the USA and Switzerland) while some others have revised their donor priorities over time which has been reflected in variable commitments. Half a dozen countries in ECE Central have provided little or no ODA contributions to forestry (less than \$1 million/year), although they may have contributed to forestry projects under other headings, notably the Rio Markers.

There are some new donor countries in the region (Czech Republic and Slovakia) that have recently started to provide financial support in forestry to ECE East-Southeast countries but the scale is still limited.

Figure 2.4.2
Total ODA from ECE countries, 2011-2012
Source: Calculated on the basis of OECD/DAC data base

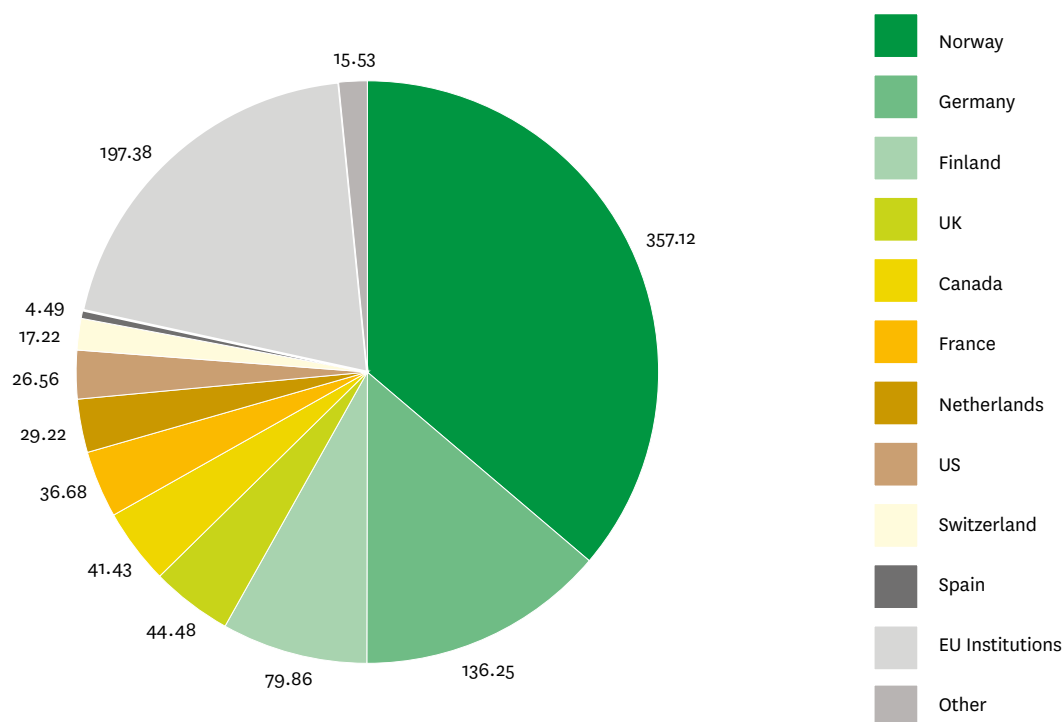


Figure 2.4.3

Recipients of ECE forestry ODA in 2012 by region

Source: Calculated on the basis of OECD/DAC data base

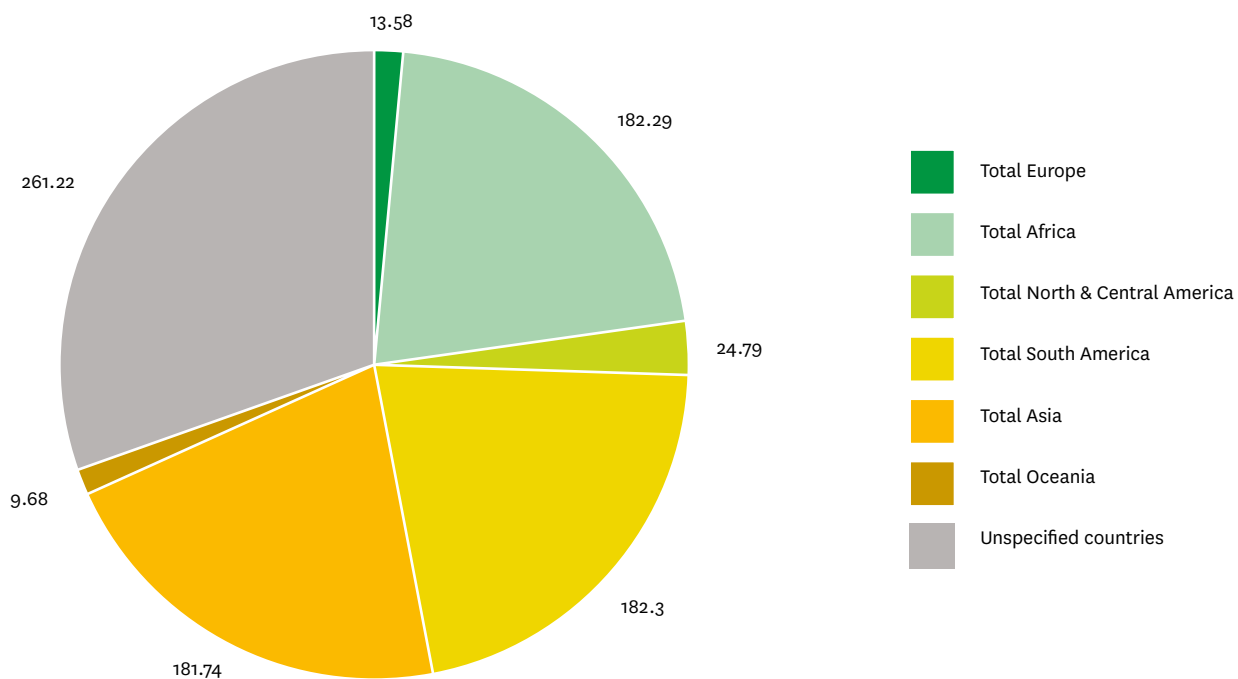
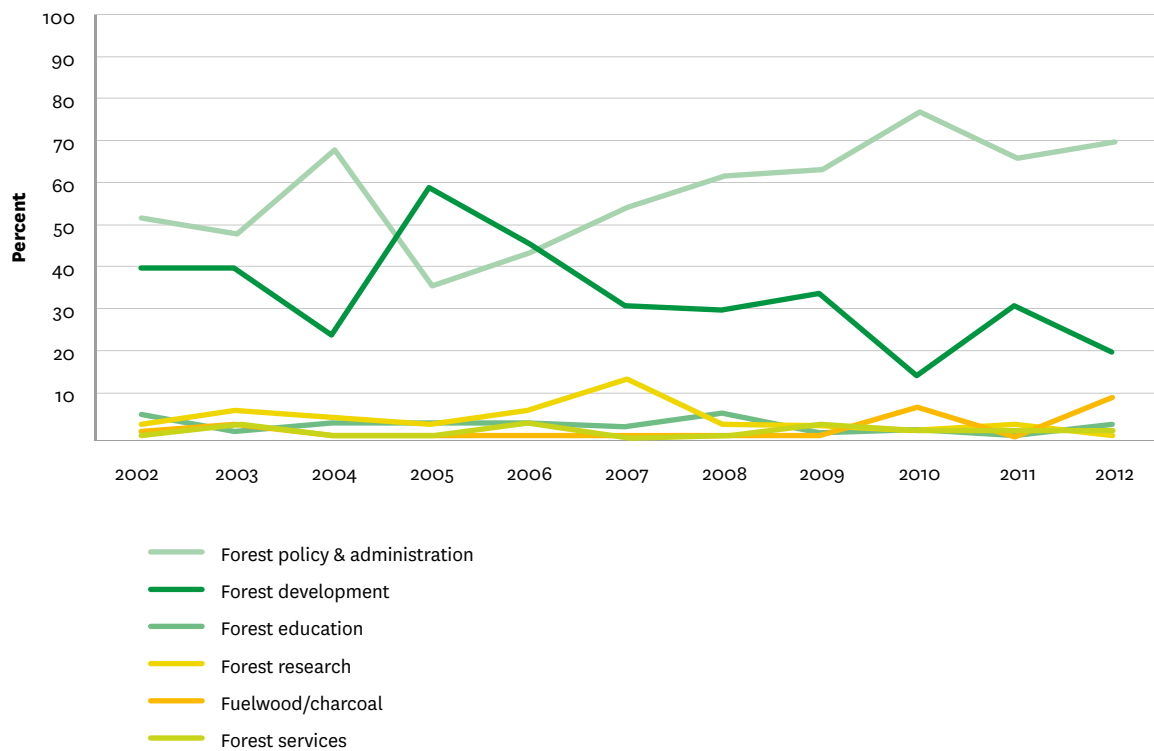


Figure 2.4.4

Total forestry ODA by component

Source: Calculated on the basis of OECD/DAC data base



The forestry ODA from the ECE countries has been relatively evenly shared between the three main recipient regions, i.e. Africa, Asia and South America, each accounting for 21 per cent of the total in 2012 (Figure 2.4.3). The share of “unspecified countries” (regional and international organizations and projects) was 30 per cent and the remaining 7 per cent was divided between Countries with Economies in Transition, Central America and Oceania.

Multilateral and various other international channels and programmes to forests represented about a third of the total volume of forestry ODA. These mechanisms include among others: the Global Environment Facility, the World Bank and regional development banks, FAO, ITTO, as well as various non-governmental organizations. An increasing importance has recently been given to REDD-plus related mechanisms, such as the UN-REDD Program, the Forest Carbon Partnership Facility, and the Forest Investment Program, the BioCarbon Fund, which have received most of their funding from the ECE West and ECE Central countries. A number of countries have also launched important bilateral forest-climate initiatives, notably Norway, the USA, Germany, Japan and the United Kingdom.³⁷

The OECD/DAC data provides details also on thematic components of forestry ODA (Figure 2.4.4). More than two thirds of the total is provided to forestry policy and administration with a growing trend since 2007. Increased awareness of the importance of policy and institutional strengthening for achieving SFM in developing countries has apparently been the main driver for this change. Part of the increased funding in this area has been linked with initiatives to eliminate illegal logging and trade such as the EU FLEGT Action Plan and its Voluntary Partnership

Agreements, the revision of the Lacey Act and new bilateral trade agreements of the USA, and the related activities of CITES, FAO, ITTO and other actors.

The second largest component of forestry ODA is forest development, accounting for 20-30 percent of the total.³⁸ The share has varied over the years but a clear declining trend can be observed in this component. Fuelwood and charcoal has been a marginal support area during the past ten years but its importance has recently increased. In 2012 it represented nine percent of the total, indicating a growing interest in forest-based biofuels in developing countries. The rest of forestry ODA is shared between forest education, forest services and forest research, each accounting for about one percent of the total or less.

There are differences in the thematic pattern of forestry ODA between donor countries. For instance, Sweden allocated more than half of its support to forest services in 2011-12 and the Netherlands almost a third to forest research. The EU institutions, Denmark and Finland are examples of donors that have prioritised forest development, accounting for more than half of their total forestry ODA. The USA, Norway, Switzerland, the UK, Austria and Spain have allocated significantly more of their aid to forestry policy and administration than the other ECE countries.³⁹

The review of the forestry ODA by component suggests that the current OECD/DAC breakdown may no longer fully reflect the priorities of donor and recipient countries which would call for reconsideration of the targeted categories to improve analytical possibilities of the DAC statistics. The interpretation of forest development and forest services could be clarified in view of increasing financing flows to climate change mitigation and adaptation as well as to forest biodiversity conservation as part of SFM.⁴⁰

³⁷ UNFCCC (2014)

³⁸ Forest development contains all other types of activities which are not reported under forestry policy & administration, fuelwood and charcoal, forest education, forest services and forest research.

³⁹ The statistical data does not appear to be always consistent and therefore the differences among thematic areas between countries have to be analyzed with care.

⁴⁰ The implications of Sustainable Development Goals for forestry financing could also be considered in this connection.

It should be noted that the above review of the composition of forestry ODA does not include significant funding to SFM provided to conservation and sustainable use of forest biodiversity, which is recorded under the respective Rio Marker (CBD). Another important area that has recently enjoyed a rapid growth in ODA is Reduced Emissions from Deforestation and Forest Degradation in Developing Countries (REDD), which may not be duly reflected in the OECD/DAC statistics on forestry, as this support has also been reported under climate change mitigation and adaptation (Rio Marker UNFCCC). Forestry is also identified as a recipient sector under UNCCD.

WHAT FINANCIAL RESOURCES FROM ALL SOURCES HAVE BEEN SUPPLIED FOR THE IMPLEMENTATION OF SUSTAINABLE FOREST MANAGEMENT INSIDE THE ECE REGION?

This section addresses all financial sources for SFM implementation inside the ECE Region (other than ODA). These include: (i) domestic public funding for management of state-owned forests, public forest administration, and financial support to private forest owners and communities; (ii) private financing, which is the main financial resource for SFM implementation in the ECE Region coming both from private forest owners and investors, largely from the income generated from the sales of forest produce and services; and (iii) payments for forest ecosystem services, (including forest carbon markets) which originate both from public and private sources. In the ECE Region, ODA is not a significant source of funding for forestry, with the exception of some countries in ECE South East.

Unfortunately, these issues have been little discussed at the international level in the ECE Region, so the data are incomplete and not very comparable. This section should therefore be considered an initial approach rather than a full analysis based on good data.

DOMESTIC AND EU PUBLIC FINANCING

There are no comparable statistical data available on domestic public financing for forests in the ECE countries. A questionnaire survey was carried out in connection with the preparation of the State of Europe's Forests 2011⁴¹ that tried to address this constraint. The results of the survey, even though partial, are the source of information of this section. In addition to deficiencies in the statistical data, there is a wide variety between countries concerning the complex of policy instruments and measures used for financial support to forestry; this makes comparisons difficult. The diversity of national situations (ownership structures, institutions, legal frameworks, etc.) and sectorial and managerial objectives also vary.

Overall, many countries focus their financing on: support to economic activities through R&D, provision of information, maintenance and enhancement of the resource base and wood supply, and improvement of infrastructure. Some countries also invest in promotion of wood use. An increasing number of countries also support or compensate the provision of ecosystem and social services of forests, in state and private forests.⁴²

In private forests, subsidies are frequently used for promoting afforestation (e.g. Denmark, Poland, United Kingdom); tending young stands; measures to enhance biodiversity; the elaboration of forest management plans (e.g. Bulgaria). National Rural Development Programmes, co-financed by the EU, have often been the framework for support to private forest management through subsidies and incentives. In addition, the mix of financial instruments includes a range of other measures (tax breaks, investment support, soft loans, trust funds, financing of extension services, etc.).

⁴¹ Forest Europe, UNECE and FAO 2011.

⁴² In 2010 the following countries reported financing of forest services: Austria, Bulgaria, Cyprus, France, Hungary, Italy, Netherlands, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

In ECE Central, the annual total public expenditure on all forest related activities around 2010 was estimated at €4.3 billion per year of which €17 billion were transfer payments to private forest management.⁴³ Total public expenditure per year per hectare varies extensively between countries averaging at €18.4 ranging from nil to €284. This variation is explained by many factors, including national policy objectives, competitiveness of the forest sector, and need to improve economic viability of long-term forestry investments. Many countries focus on financing through direct, supply-side support to economic activities, such as R&D (e.g. Finland, Portugal, Slovakia); information provision; support to maintain or enhance the resource base and wood supply (e.g. Austria, Cyprus, Finland, Ireland); investment support; or improving infrastructure. In countries where state forest management was undertaken as part of the government responsibility (e.g. Belarus, Cyprus, Russian Federation, Romania, United Kingdom, Turkey), different budget allocation and revenue collection arrangements are in place to ensure funding from and distribution of revenues between central government and sub-national government budgets (Forest Europe/UNECE/FAO, 2011).

In Europe, co-financing by the EU in total public funding was about €1.1 billion per year in 2007-2013 (Forest Europe/UNECE/FAO, 2011). Since 2007, the most important changes in the public sector forest financing in ECE Central have been the support provided by the EU to accession countries and through the EU Rural Development Programme 2007-2013. The EU Rural Development Regulation has 14 forestry measures, most of which are aimed at promoting sustainable forest management and the multifunctional role of forests. The emphasis has been placed on the measures supporting training, investments to improve the economic value of forests, adding value to forestry

products, developing forest infrastructure, afforestation of agricultural land, restoring forestry potential, and various non-productive investments. The total amount of financial resources allocated to the eight forestry measures during the period 2007-2013 was € 12 billion (European Commission, 2009).

Domestic funding has recently been influenced by changes in taxation and financial support measures, the world economic and financial crisis, as well as shifts in policy objectives. The resulting trends at country-level have also been mixed, as in some cases there have been increased financing flows, while in other cases the flows have been flat or declining. In a number of countries in ECE East and the eastern part of ECE Central, the decline of domestic public funding has been drastic. Several experts now consider that these governments' capacity to implement their regulatory and promotional functions have been limited by lack of financial resources. Russia also has had difficulties in effectively managing its vast forest resources because of limitations in funding.

PRIVATE FINANCING

Information on private financing to forests (domestic and international) is more scarce than that on the public sector. Nevertheless, it appears that most of the financing of SFM has come from private landowners and forest managers from a variety of sources (revenue from sales of forest products, savings, credits, etc.). Forest industry companies have been large forest owners in the past but many of them have divested their assets, for a variety of reasons, through sales to institutional investors who rely on timberland management organisations (TIMOs), real estate investment trusts (REITs) and other arrangements. Institutional investors increasingly recognize forest assets as valuable long-term investments that complement their diverse portfolios.

⁴³ Based on data by 24 countries representing 74.2% of forest and wooded land area in the FOREST EUROPE region (without the Russian Federation).

They are interested in owning assets, the physical productivity of which is not subject to stock market volatility, which generate stable medium and long term returns.

Institutional investment coming from pension funds and other financial institutions, based outside the forest sector, represents a relatively new source of private sector financing to forests. In 2005-2006 this type of finance was estimated at about \$15-30 billion worldwide, of which 91 percent were in North America, five percent in Oceania and less than four percent in emerging markets. By 2008, the estimated allocation of investments had increased to \$50 billion. Investor capital placed in timberland is presently estimated at around \$70-80 billion, which in addition to US sources, includes European institutional investors and timberlands owned by private equity companies and family offices (Dasos Capital, 2013). In 2013, the total area under these arrangements was estimated at 12.2 million ha of which 73 percent is in the USA (Timber Mart-South Market News Quarterly, 2013).

In eastern central Europe and the Baltic countries, restitution of state-owned forestland to private citizens has led to selling of assets to institutional investors. Especially in Poland, Romania, Estonia, Latvia and Lithuania, large amounts of timberland and land suitable for afforestation/reforestation have been restituted to pre-war owners who are usually no longer active or interested in forestry. Europe is facing a remarkable challenge in bringing these forests, often characterized by small size of properties, under sustainable management and efficient economic use (Dasos Capital, 2013).

The fragmentation of forest ownership causes inefficiency in forestry operations and subsequently smallholders have difficulty in justifying long-term investments in silviculture and infrastructure. In addition to timber production, the

development of ecosystem services, climate change mitigation and demand for wood-based energy have been driving expansion of institutional investment in forests. Whatever the driver of private investment, it is getting clear that investing in sustainable forest management is becoming more and more attractive. Private financing, when done responsibly, can provide the necessary level of investment for SFM. Although traditionally considered one of the greatest threats to sustainable forest management, the private financial sector is, perhaps surprisingly, emerging as one of its most potent potential allies (Asen, et al. 2012).

PAYMENTS FOR ECOSYSTEM SERVICES AS A SOURCE OF FUNDING FOR SFM

There is a growing interest in implementing schemes of payments for ecosystem services (PES) as a means to compensate the public goods benefits of SFM to their producers through various mechanisms in the ECE Region. Most of the existing schemes focus on compensation of lost economic benefits arising from conservation of biodiversity or water resources in specific local conditions, where these ecosystem services have particularly high societal values. Many such projects have been successful and locally important but they have been difficult to fund. Both public and private funding sources have been deterred, partly due to the complexity of setting up these arrangements. A recent review of PES schemes in the ECE Region identified examples of implementation in a total of 15 countries⁴⁴ but did not collect systematic information on the volume of financial transactions (UNECE/UNEP/FAO, 2014)

Several ECE countries, e.g., Finland, Norway, Sweden, and Switzerland, have national schemes for compensating private and public forest owners for maintaining particular attributes of the forest holdings. In general, the demand

⁴⁴ Albania, Denmark, Finland, France, Georgia, Germany, Kyrgyzstan, Latvia, Moldova, Netherlands, Norway, Portugal, Sweden, Switzerland and the United States.

for funding exceeds the available supply, which demonstrates private forest owners' growing interest in SFM, if they can be remunerated. State forest agencies and other public bodies have often benefited from these schemes.

The wider use of the payment for ecosystem services schemes has the potential to make significant changes in the economic structure of the forest sector and to modify the priorities of forest owners, who could derive income from providing ecosystem services which were previously supplied as a public good, including supply of clean water, erosion and flood control, local environmental protection and many others. Development of payment for ecosystem services could be a part of a transition towards a "green economy", including economic and environmental accounts ("green national accounting"), and natural capital accounting.⁴⁵ Taken together, these developments would not only transform the management priorities of the forest sector, but raise its profile in society and encourage it to make a bigger contribution to social welfare.

FOREST CARBON MARKETS

Financing of measures for climate change mitigation (and adaptation) is a recent source of financing for forest management activities. Most has come from the voluntary carbon market, as compliance markets are limited. The European Union Trading Scheme excludes emission reductions from forests and there are few Joint Implementation projects under the Clean Development Mechanism. Due to the lack of international regulatory mechanisms, emission reductions have suffered from a relatively slow development, which during the last few years has been exacerbated because of uncertainty of the future under the Kyoto Protocol.

The total size of the voluntary market for forest carbon offsets has been estimated at \$379 million corresponding to 134 million tonnes of CO₂ equivalent in 2013. In value terms this represents 43 per cent less than in 2008. The majority (71%) of forestry offsets transacted in 2012 were sold to voluntary buyers, while the remainder were sought by businesses (complying with or preparing for regulation). The private sector remained the largest pool of buyers, accounting for 70% of offsets transacted in 2012 (Peters-Stanley and Gonzalez, 2014).

European buyers have been the major purchasers of voluntary forest carbon offsets from projects around the world (half of all offsets transacted in 2011-2012). However, the region's share of the global market on the supply side remains small. Forestry carbon projects have not played a significant role in the region, as only afforestation/reforestation projects under the Clean Development Mechanism (CDM) have been eligible. (Peters-Stanley and Yin, 2013).

North America is the second largest source of financing carbon offsets, accounting for about a quarter of the global market but the region's projects only generated more than one quarter of the offsets transacted in 2012. About 27% of this volume was sought by buyers targeted at compliance carbon markets in California, British Columbia, and Alberta while the rest was transacted outside the region. Drivers for offset transactions have been investors seeking a share of offset revenues, or the developers themselves fronting project costs with company or personal capital. The majority of project developers using private equity were also private-sector entities (Peters-Stanley & Gonzalez 2014).

The forest carbon market has not yet met the expectations of investors and project developers, as the potential supply far exceeds the current demand, and the carbon price has been much lower than

⁴⁵ See, for instance, the papers presented to the session on Measuring and communicating the contribution of the forest sector to a green economy, at the 72nd session of COFFI in Kazan, Russia in November 2014.

expected for reasons arising outside the forest sector. The future development is likely to depend on regulatory markets enabling buyers to use their investment in complying with their own emission reduction requirements.

ASSESSMENT OF THE ECE REGION'S PROGRESS TOWARDS GLOBAL OBJECTIVE ON FORESTS 4

It is clear that the ECE countries, as a whole, have been able to meet the fourth global objective on forests on forestry ODA, at least as far as bilateral flows are concerned. Furthermore, it seems that most of the increase has been from “new and additional” sources. However, not all countries in the region have contributed to forestry ODA. The 2012 drop in the financing flows is a cause of concern if it stays permanent. Part of the drop may be due to the fact that an increasing share of ODA to forests is reported under the Rio Markers, in which case forestry is not the principal objective but can be a significant one. In particular, the increasing bilateral support provided to REDD-plus may have been reported under climate change rather than forestry, perhaps giving the (false) impression that ODA to forests has dropped in 2012. However, the difficult economic conditions may also have been the cause of reductions.

Another cause of concern is that the volume of ODA to forests largely depends on a small number of ECE countries as the main donors. Changes in their national development policies could occur and would result in significant impacts on the total aid to developing countries and countries with economies in transition.

There is not sufficient information on domestic public funding for ECE forests to establish clear trends since 2007. However, it can be assumed that the funding flows have remained largely stable with the recent financial crisis impacting support to forestry. Domestic public

funding to forestry is gradually changing from support for production to support for environmental conservation, both through reallocation within the existing financial instruments and through the introduction of compensation schemes for forest ecosystem services. In ECE Central, the EU Rural Development Programme 2014-2020 will offer new possibilities but it is still too early to assess to what extent SFM will be funded through this mechanism.

Emerging interest among institutional investors⁴⁶ in SFM assets is a positive sign and is likely to play an increasing role, particularly in ECE Central and possibly also ECE South-East and the Russian Federation, if the investment climate remains sufficiently attractive. PES schemes, including carbon offsets, are a promising recent source of financing SFM, but they are still mostly local- and project- based. Mainstreaming of PES schemes would often be needed to tap these sources. There are also major policy issues to be considered for PES development, including possible market distorting impacts.

The revenue received from the sales of forest produce and services in many ECE countries is largely sufficient to achieve SFM in many forests in the region, particularly in ECE Central and parts of ECE West but this is not always the case, as there are wide differences in the biophysical characteristics of the resource (including accessibility) between countries and between regions within countries. It appears that the current public support for SFM is often not adequate, particularly for ensuring the maintenance of public goods and ecosystem services of forests. The very long-term investment horizon in the temperate and boreal zones means that some public sector support continues to be necessary when private forest owners cannot justify such expenditure. The current situation is far from the goal of SFM being financially sustainable in its own right.

⁴⁶ Institutional investors are organizations which pool large sums of money for investment in ventures that may be too large for individual investors to speculate on by themselves. Typical institutional investors include banks, insurance companies, retirement or pension funds, hedge funds, investment advisors and mutual funds.

Fragmentation of forest ownership characterized by the small size of properties in many ECE countries is another obstacle to achieving profitable forest management. Economies of scale can be tapped by grouping of forest owners through various arrangements, but also large-scale investors are needed.

The forest sector tends to suffer from serious economic difficulties due to its

weak competitiveness, notably because of high land prices and labour costs, at least in ECE Central. There will be increasing pressure on forests in many parts of the ECE Region and therefore ensuring adequate financing for SFM implementation will remain a key issue in national forest policies. The long-term objective is to make SFM financially sustainable in its own right in the ECE Region as a whole but the current situation is still far from this goal.

2.5 OVERVIEW OF PROGRESS TOWARDS GLOBAL OBJECTIVES ON FORESTS

GLOBAL OBJECTIVE 1: REVERSE THE LOSS OF FOREST COVER WORLDWIDE THROUGH SUSTAINABLE FOREST MANAGEMENT, INCLUDING PROTECTION, RESTORATION, AFFORESTATION AND REFORESTATION, AND INCREASE EFFORTS TO PREVENT FOREST DEGRADATION

HAS FOREST COVER IN THE ECE REGION EXPANDED OR DECLINED? WHAT HAVE BEEN THE CONTRIBUTIONS OF AFFORESTATION AND REFORESTATION?

Forest cover has been expanding in all parts of the region for several decades. The net increase between 2000 and 2015 was 28.1 million ha, or 1.5% of the total area of forest and other wooded land in 2000, although deforestation occurs alongside forest expansion. Forest and other wooded land area now totals 1.88 billion ha. Natural expansion, mostly onto former agricultural land, driven notably by economic factors, agriculture policy and rural depopulation, accounts for most of the increase, but afforestation in the context of public programmes has played a significant role in some countries. Reforestation, in the sense of establishing forests on areas where forest had recently been removed, is not significant in this context of expanding forest cover, although regeneration – replacing forest cover which has been temporarily removed through harvest or damage – is an essential

part of sustainable forest management in the ECE Region.

WHAT ARE THE MAJOR BIOMASS AND CARBON STOCKS AND FLOWS CONNECTED TO FORESTS OF THE ECE REGION, AND HOW HAS THE ROLE OF FOREST MANAGEMENT INFLUENCED THESE TRENDS?

The total amount of carbon in aboveground living biomass in the ECE countries amounts to 64.3 Gt carbon, more than 80% of which is found in three countries, Russia, Canada and USA. The stock of carbon in harvested wood products in the region is over 5 Gt. The total forest biomass carbon sink – the carbon sequestered each year by ECE Region forest ecosystems, – in ECE forests amounted to 255 million tonnes carbon per year between 2005 and 2010. The ECE forests are a significant carbon sink although there is uncertainty over its size, and its underlying causes. Forest management has the possibility to continuously maintain a carbon stock over larger forest estates,

while at the same time sustainably producing wood products and biomass for bioenergy. However, in the large regions of ECE West and ECE East, the size of the sink seems difficult to control. There is a risk of unintended carbon emissions through hazards such as fire, insects, wind, etc. These disturbances as well as other trends, notably the increase in average age of forests, are indications that at some point the sink will saturate. In recent years, the sink size has not increased in ECE East and South-East.

WHAT IS THE AREA OF SUSTAINABLY MANAGED FOREST IN THE ECE REGION, AND HOW FAST IS IT INCREASING?

Three methods have been used to estimate the trends in area of sustainably managed forest:

- About 80 per cent of the ECE forests are already under forest management plans or equivalent and there has been only a marginal increase in the area. Forests without management plans tend to be small, and with inactive/absent ownership.
- The area of forests certified as sustainably managed in the ECE Region was 383 million ha, of which more than half is found in the two North American countries, and 28 per cent in ECE Central. The ECE Region as a whole accounted for 88 per cent of the world's certified forest area in 2014. Between 2006 and 2013, the certified area in the ECE Region expanded by 45%.

GLOBAL OBJECTIVE 2: ENHANCE FOREST-BASED ECONOMIC, SOCIAL AND ENVIRONMENTAL BENEFITS, INCLUDING BY IMPROVING THE LIVELIHOODS OF FOREST DEPENDENT PEOPLE

HAVE THE ECONOMIC BENEFITS SUPPLIED BY ECE REGION FORESTS INCREASED OR DECREASED?

Harvests have recovered partly after the slump in 2008-2010 but the forest sector's contribution to GDP has fallen in absolute terms, and its share in total

- Almost all ECE member countries are members of one or more regional processes of criteria and indicators of sustainable forest management, notably the Montréal Process and Forest Europe. The widespread use of these criteria and indicators sets is an indication of the high level policy concern for sustainable forest management, although challenges remain for implementation.

These are all measures of management, and not a direct measurement of results. Nevertheless, taken together these trends indicate that there are very significant areas of sustainably managed forest in the ECE Region, and that this share has been growing over the past two decades – or that there is a stronger ability and determination to demonstrate this trend.

HOW MUCH FOREST DEGRADATION IS TAKING PLACE IN THE ECE REGION, AND WHAT PROTECTION AND RESTORATION IS BEING UNDERTAKEN?

There is no objective information on forest degradation as there are major problems of definition and measurement. It is clear, however, that in the ECE Region there are local or regional occurrences of forest degradation from a variety of causes including fire and insects but also fragmentation around urban areas, mining, radiation, land mines and other damage from war and conflict.

national GDP has declined steeply. Employment in the forest sector has fallen, notably because of higher labour productivity. The recession which started in 2008 has also increased unemployment and economic hardship in forest dependent communities and regions. Forests also supply considerable

benefits through the provision of commercial recreational opportunities and non-wood forest products for consumption or sale, though quantitative measures of these benefits for the ECE Region as a whole are lacking.

HAVE THE SOCIAL BENEFITS SUPPLIED BY ECE REGION FORESTS INCREASED OR DECREASED?

There has probably been increased access to forests for recreation, as more people in urban areas use forests. Forest management planning increasingly recognises amenity and use values. However, forest fragmentation and degradation of forest health may be reducing the social benefits available in some areas. Declines in employment and livelihood also reduce social benefits. Safety and health of forest workers are a cause for concern.

HAVE THE ENVIRONMENTAL BENEFITS SUPPLIED BY ECE REGION FORESTS INCREASED OR DECREASED?

The area of protected forests has grown and supply of environmental benefits is increasingly considered in management strategies. Conservation credit exchanges and payment for ecosystem services are greatly discussed, but are still rare in practice. There is continuing pressure on forest habitats. Forest fragmentation, degradation and the conversion of primary forests to secondary or plantation forests may also reduce the supply of environmental benefits, particularly with regard to the conservation of native biodiversity.

HAVE THE LIVELIHOODS OF FOREST DEPENDENT PEOPLE BEEN IMPROVED?

This issue is being increasingly recognised in the ECE Region, but so far has been little analysed. Endemic poverty persists in many indigenous communities and other rural forested areas. Trends in livelihoods of forest owners are not clear. Sharp declines in forest sector employment have resulted in reduced livelihoods and caused hardship to unemployed workers and their communities, particularly in timber dependent areas.

DOES THE FOREST SECTOR IN THE ECE REGION CONTRIBUTE TO CLIMATE CHANGE MITIGATION?

Forest ecosystems sequester carbon from the atmosphere, and store it over long periods, in the forest ecosystem and, after harvest, in forest products. In addition, the use of products and energy from sustainably managed forests to substitute for non-renewable materials and energy sources contributes to climate change mitigation, although it is difficult to quantify the substitution effect. There is potential to further develop all these approaches, for instance by intensifying silviculture, mobilising wood supply, lengthening service life of wood products, promoting consumption of sustainably produced forest products and wood energy. However, there are tradeoffs between these strategic objectives as well as with other forest management objectives. The monetary value of the carbon sequestered annually by ECE Region forests is estimated at \$130 billion, at a carbon price of \$10/tonnes. Furthermore, significant political barriers to achieving higher levels of forest based carbon sequestration exist in many countries, particularly in ECE West.

GLOBAL OBJECTIVE 3: INCREASE SIGNIFICANTLY THE AREA OF PROTECTED FORESTS WORLDWIDE AND OTHER AREAS OF SUSTAINABLY MANAGED FORESTS, AS WELL AS THE PROPORTION OF FOREST PRODUCTS FROM SUSTAINABLY MANAGED FORESTS

HAS THE AREA OF FORESTS PROTECTED FOR CONSERVATION OF BIODIVERSITY, INCLUDING BY ACTIVE MANAGEMENT, INCREASED OR DECREASED?

Integrated forest management approaches, emphasizing the biodiversity component, have expanded in the whole ECE Region during the last 20 years. The benefits for biodiversity can already be seen in the recorded increase of the deadwood component in commercially managed semi-natural forests.

In 2015 about 12% of the forest area in the ECE Region is designated for conservation of biodiversity. The area of forests protected for biodiversity has increased continually during the 20 years period in the whole ECE Region.

In many ECE countries the international commitments on biodiversity, notably the Aichi targets, are being integrated into national legislation and policies but implementation is challenging and much remains to be done in some countries.

HAS THE SHARE OF CONSUMPTION OF PRODUCTS FROM SUSTAINABLY MANAGED FORESTS INCREASED?

There are many indications that the share of consumption of forest products from sustainably managed forest has in fact increased strongly over the last decade. The potential supply of certified forest products increased by about 30% between 2007 and 2013, and is about 490 million m³. The number of chain of custody certificates grew even faster: the total (FSC+PEFC) was about 28 000 in mid 2014, 3.5 times more than in 2006. In addition, an increasing number of public sector initiatives are promoting production and consumption of sustainably produced forest products and discouraging unsustainably produced forest products, notably the US Lacey Act and the EU Timber Regulation, and changed rules for green public procurement. There have been also numerous private initiatives, including creation of private procurement rules, green building initiatives and codes of conduct.

GLOBAL OBJECTIVE 4: REVERSE THE DECLINE IN OFFICIAL DEVELOPMENT ASSISTANCE FOR SUSTAINABLE FOREST MANAGEMENT AND MOBILIZE SIGNIFICANTLY INCREASED, NEW AND ADDITIONAL FINANCIAL RESOURCES FROM ALL SOURCES FOR THE IMPLEMENTATION OF SUSTAINABLE FOREST MANAGEMENT

WHAT ARE THE TRENDS FOR OFFICIAL DEVELOPMENT ASSISTANCE FOR SUSTAINABLE FOREST MANAGEMENT?

The total annual bilateral ODA to forestry from the ECE countries averaged nearly \$1 billion in 2011-2012, more than five times the volume in 2005-07. In 2009-12 the ECE countries represented 75-80% of the total bilateral forestry ODA. It can be assumed that part if not most of the increase in forestry ODA has been “new and additional”. ODA for forestry is often

reported under other headings, such as climate change (e.g. REDD+), as well as multi lateral development assistance.

WHAT FINANCIAL RESOURCES FROM ALL SOURCES HAVE BEEN SUPPLIED FOR THE IMPLEMENTATION OF SUSTAINABLE FOREST MANAGEMENT INSIDE THE ECE REGION?

Domestic public financing includes budgets for state forest organisations (when they are not self supporting), support to R&D and transfer payments



to private owners, typically as an incentive for various silvicultural activities. Payment for ecosystem and social services provided by forests is being developed slowly. Most private financing has come from private forest owners, notably through wood sales revenue. Many forest industry firms no longer finance forestry themselves. However investment by private financial

institutions, e.g. pension funds, through specially designed financial instruments, is rapidly growing in importance. Investor capital now placed in timberland is estimated at \$70-80 billion, for a total area of about 12 million ha, of which 73% in the USA. The private financial sector is emerging as one of the most important potential allies through its support to sustainable forest management.





CHALLENGES
AND OPPORTUNITIES
FOR THE FOREST SECTOR
IN THE ECE REGION

3.1 INTRODUCTION

Chapter 2 has presented, on the basis of the best available data, trends in the ECE Region relevant to the achievement of the four global objectives on forests, as well as the factors underlying those trends. Chapter 2 is essentially evidence driven and descriptive. What conclusions can be drawn from these facts for policy

makers in the region? Chapter 3 will attempt to identify the major challenges facing the forests and the forest sector in the ECE Region, on the basis of the facts and trends reported in chapter 2, as a contribution to discussion on directions and priorities, at the local, national and international levels.

3.2 BACKGROUND TO THE CHALLENGES: OUTLOOK FOR FORESTS AND THE FOREST SECTOR IN THE REGION

Challenges arise not from a static position, but from a dynamic movement, towards negative outcomes to be avoided, or desirable outcomes to be pursued. It is therefore useful to prepare outlook studies which project into the future the observed trends and their possible interactions, also with developments for other sectors, and to use these studies as a basis for identifying challenges. This section briefly summarises the three international outlook studies recently carried out by ECE and FAO, which contain valuable indications, based on objective and transparent analysis of trends to the middle of the twenty-first century in the three main parts of the ECE Region. Given their broad international background, their objective methods and the transparency of their processes, they may be taken as a background or reference for the outlook of the sector as a whole in the ECE Region. The three studies also identify those issues and challenges seen as the most important

at the time of drafting – 2010-2012 approximately.

Readers are referred to the three studies for full results and more detailed information on methods and assumptions. All three studies have a reference scenario, and alternative, or policy, scenarios, which describe how the outlook would change in differing circumstances. All three address the outlook for a period to 2030. The reference scenarios assume steady, but not fast, economic growth and demographic trends in accordance with UN and IPCC base projections, with no disruptive changes in markets or technology, but rather continuation of past trends. However, the big risks may be in discontinuities, not accounted for in the “business as usual” scenarios, and much harder to project and analyse. The North American and European studies explicitly model international trade, although not for all products.

3.2.1 OUTLOOK FOR NORTH AMERICA

According to the North American Forest Sector Outlook Study 2006-2030 (NAFSOS), markets for wood products (sawnwood and panels, mostly destined for construction)

are projected to recover pre-bubble levels by 2015, and then grow relatively slowly. Total paper and paperboard production in North America is also projected, under all

scenarios, to continue its steady upward trend, despite the decline in US newsprint production. Wood pulp production is projected to rise in Canada, but fall in the USA, although production of recovered paper will rise strongly in the USA. The parameters and data underlying these projections, however, pre-dated the global recession, and so the projections have not tracked well the experiences of especially the paper sector in the USA. Much of the paper sector output, particularly for paperboard, is intimately tied to the demands for packaging by the manufacturing sector, which has been in an unsteady decline since 1999 in the USA, and is likely to trend downward into the foreseeable future. The expected recovery in traditional forest products markets is accompanied by great uncertainty about the extent and consequences of production of wood energy. If wood energy supply is consistent with the volumes the IPCC in its report considered necessary to stabilise climate change (assuming a constant share of bioenergy in renewables), it would increase 4-5 times between 2006 and 2030 in the USA and 3-7 times in Canada, with steep price rises. However, if the historical mix between energy and industrial wood is assumed to stay constant, the increases in wood energy are relatively small in both countries, a clear indication of the importance of policy factors in driving the expansion of wood energy. Policies that drive such an expansion have recently emerged from multiple sources, and more are likely to emerge in the future. These include laws and regulations in the U.S. that require renewable fuels in the electricity sector, possible stricter state and federal regulations (in the USA) requiring renewable fuels contents in energy production and limits in net carbon emissions from power plants, and policies in Europe (in particular, the European Union's 2020 Climate and Energy Package) that drive demand for wood energy, notably pellets, for export that are produced in North America.

In all scenarios, forest area would decline slightly in North/Central America (i.e. a larger region than the two countries of North America, as Mexico is included), although growing stock would rise slightly. No declines are projected specifically for Canada. Indeed, most of the projected decline in forest area would occur as a result of urban expansion to accommodate population growth in the USA. The USA losses of forest area would be concentrated in the south-eastern US, in areas where populations are rising rapidly, forests are present, and perhaps paradoxically, a large share of North American industrial roundwood is produced. Forest ownership in this part of the USA is dominated by private landowners, so there is limited scope for concerted actions to constrain losses of forests and the ecosystem goods and services that they provide. Forest loss in this region, as well as losses projected for rapidly growing and forested parts of the West Coast of the USA, raise the spectre of the elimination of critical habitat for at-risk forest-dependent species. This is especially true for imperilled aquatic species, whose most threatened populations are concentrated in these two parts of the USA. Forest loss would also impact rising populations seeking forest-based recreation opportunities. This is especially true in the south-eastern U.S., where private land dominates and public land-based recreation opportunities are currently limited. Another aspect of forest loss related to urban expansion is that it is projected to accelerate forest fragmentation, where new roads and housing break up interior forests into fragments, reducing the habitat of species requiring unbroken forests, notably birds. Finally, projected losses and fragmentation of forests, when coupled with climate change, are projected to lead to alterations in forest types and compositions, with attendant effects on ecosystem goods and service provision and availability of critical habitats.

In spite of long-run expectation of forest losses, production of industrial roundwood in the USA would recover pre-recession levels by 2015, and continue to increase to 2030 in the scenarios with high wood energy demand. However, it would stagnate under the “low fuelwood” assumption. The latter scenario suggests that unless more wood is used for energy (i.e. through the emergence of a wood-based bioenergy sector) than at present, the production of industrial roundwood in both countries would stagnate or even decline after a brief recovery, and prices would fall.

Most trade in forest products of the two countries would continue to be inside the region, mostly from Canada to the USA. Canada’s Revealed Comparative Advantage (a measure of competitiveness) for roundwood and forest products is expected to remain the highest in the world. Nevertheless, although the projections do not specifically track the trade positions of all countries with respect to Canada or the USA, recent evidence indicates declining overall shares of global roundwood production for both Canada and the United States. This decline may be partly a result of rapid developments in the wood and paper processing sectors of China and other Asian nations as well as structural changes for international trade in roundwood and fibre.

Disturbance processes such as wildfire, forest pests and invasive species are

not explicitly modelled in the NAFSOS (although they are addressed in the national studies on which it draws notably the RPA work in the USA), but forest disturbances are increasingly recognized as a principal challenge for managers and a major threat to forest health and integrity in the coming decades. These processes are often linked in a dynamic fashion, with one form of disturbance (bark beetles in the western regions of the continent, for example) increasing susceptibility to other forms (e.g. fire in pest weakened forest stands). Climate change will probably exacerbate these disturbances in predicted and unpredicted ways.

Disturbance has already strongly influenced forest management in ECE West. Fire incidence and severity has been on the rise in recent years, and forest management agencies have had to devote an increasing proportion of their resources to fire suppression. Moreover, while in the past timber production and wildland preservation were major competing management objectives, forest restoration treatments are becoming a central focus, especially in fire prone regions with high levels of forest fuel loading. These and similar issues will continue to challenge managers in the coming years, requiring flexible and innovative approaches and entailing changes in forest composition that will at least partially be beyond management control.

3.2.2 OUTLOOK FOR EUROPE

The European Forest Sector Outlook Study 2010-2030 (EFSOS II) focuses on seven major challenges for the sector:

- mitigating climate change,
- supplying renewable energy,
- adapting to climate change and protecting forests,
- protecting and enhancing biodiversity,

- supplying renewable and competitive forest products,
- achieving and demonstrating sustainability and
- developing appropriate policies and institutions.

EFSOS II uses a reference scenario and four policy scenarios, to explore the possible consequences of major policy choices.

According to EFSOS II, if no major policies or strategies are changed, consumption of forest products and wood energy will grow steadily and wood supply, notably from European forests, will expand to meet this demand. All components of supply will have to expand, especially harvest residues, but the projections seem sustainable for all countries in Europe.

As regards major policy choices:

- To maximise the sector's contribution to **climate change mitigation**, the best strategy is to combine forest management focused on carbon accumulation in the forest with a steady flow of wood for products and energy.
- If wood is to play its part in reaching the targets for **renewable energy**, there would have to be a strong mobilisation of all types of wood. Total wood supply would have to increase by nearly 50% in twenty years (assuming no significant increase in imports from other regions). However the mobilisation of such high volumes would have significant environmental, financial and institutional costs.
- If **biodiversity** were to be given priority, for instance by setting aside more land, and changing forest management practice, the supply of wood would be less than in the reference scenario,

3.2.3 OUTLOOK FOR RUSSIA

The Russian Forest Sector Outlook Study (RUFOS) notes that the country's forest sector has been relatively slow in adapting to market relations and requirements, and that the forest-wood chain (production and processing of forest products) is not a priority of national forest policy (FAO, 2012). It considers that the colossal forest potential of the country is essentially under-utilised. The study proposes three scenarios, "inertial", based on past trends,

necessitating reduced consumption of products and energy, and/or increased imports and/or intensified use of non-forest fibre sources.

- A more **innovative approach** in all parts of the sector, including forest management, could create, defend or expand markets, create new opportunities, reduce costs and increase profitability. However, developing a culture of innovation is a complex challenge, going far beyond the boundaries of the forest sector.

EFSOS II expects Europe to remain in all scenarios a net exporter of wood and forest products.

The European forest will have to adapt to changing climate conditions, and forest management needs to support the adaptation process.

Forest sector policies, institutions and instruments in Europe are in general stable, recent and effective, and increasingly enjoy public support through participatory policy making (e.g. National Forest Programmes). However the challenges described in the study are exceptionally complex and long term and will require a high level of sophisticated cross-sectoral policy making to find the necessary balanced and sustainable solutions.

"moderate", with some progress, and "innovative", the most favourable, which explores what might be achieved with high and stable economic growth, state support, stimulation of consumption of forest products, improvement of foreign trade structure, and an increase in the share of advanced wood processing.

By 2030, forest area in Russia is expected to expand by about 1%, because of conversion

of agricultural land, and growing stock to increase by up to 5% due to increases in forest area, global warming, nitrogen precipitation and cutting less than the increment. Net annual increment, carbon stock and net ecosystem production are all expected to increase, despite increased losses from fires, wind, pests and diseases. Although the area of forest available for wood supply will fall, due to increased nature conservation, allowable cut would increase.

Roundwood production is expected to increase, more than doubling, to 300 million m³ in 2030, under the innovation scenario. Roundwood exports would not increase as advanced wood processing capacity is developed inside the country. Production of sawnwood, panels, pulp and paper are all expected to increase, doubling by 2030, as will the use of wood biomass for energy. Biofuels will be mostly aimed at the domestic market, with pellet exports only from areas with the appropriate infrastructure and location. Significant investment is a precondition for this expansion.

The study draws attention to a Russian forest sector problem of global significance. At present, Russia provides about 90% of the carbon sink of the boreal forest. However, if the climate changes as predicted, carbon emissions from permafrost lands will exceed current emissions from tropical deforestation by several times.

Illegal logging causes significant ecological and economic damage, but is expected to fall in the future, especially in the innovation scenario, but not to disappear completely. The study points out that in order to resolve the question of illegal logging, progress is needed on macroeconomic issues beyond the forest sector, such as unemployment and rural poverty.

The study considers that there is a unique opportunity to transform the Russian forest sector. It is physically worn out, obsolete and in need of fundamental reconstruction. The transformation would bypass intermediate development stages and turn the sector into a renewed, vigorous, modern and progressive segment of the national and global economy.

3.2.4 MAIN FEATURES OF THE OUTLOOK FOR THE ECE REGION

Based on the three outlook studies, a few general points may be made for the ECE Region as a whole:

- With steady slow demand growth, and forest management continuing along today's lines, there is more than enough wood to meet demand for forest products in the ECE Region over the coming decades.
- Climate change is posing threats to forests all over the region, through fire and insects disturbances, extreme climatic events and changing growing conditions.
- A major uncertainty concerns the supply of wood for energy. Policies to encourage renewable energy may radically increase demand for wood. If this demand materialises, there will be pressure to mobilise much more wood, as well as changes in markets and trade patterns. This could represent a commercial opportunity for some forests in the region, and an environmental pressure on others.
- The forest sector is being called on to make a significant contribution to climate change mitigation in several ways: protecting the carbon stock in forests, developing carbon sequestration by forests and carbon storage in wood products, avoiding unnecessary carbon release by using all residues and as

many recovered products as possible, substituting products and energy derived from sustainably produced wood for products and energy based on non-renewable materials and energy.

- Structural changes are taking place in the global markets for wood raw material and forest products, with rising demand in Asia, and strong competition between suppliers, some of them in the ECE Region.
- The actors of the forest sector, including forest owners, companies, governments and civil society have the possibility to influence, even to determine, future trends, by

innovation, dynamism and improved communication.

- Policies and legislation are being put in place all over the region to combat illegal logging inside and outside the region, and exclude illegally or unsustainably produced products from the region's markets.
- Steady increases in labour productivity combined with business cycle impacts have resulted in substantial and ongoing job losses in the forest sector. When combined with endemic rural poverty in some regions, the result has been significant economic hardship in forest dependent communities.

3.3 THE FOREST SECTOR IN A GREEN ECONOMY

Another development in recent years has been the high level commitment to developing the so-called "green economy". Although definitions vary, improving human well-being and social equity while significantly reducing environmental risks and ecological scarcities are usually seen as the core of a green economy. Naturally, the forest sector is expected to contribute to the emergence of the green economy. In many ways the forest sector already has many of the features of a green economy:

- Forests provide essential environmental and social services, such as biodiversity conservation; protection against erosion; watershed protection and employment in rural areas, in addition to wood production.
- There are high levels of recycling and use of residues in the wood using industries.
- Policy tools focused on sustainability and social consensus have been developed and put in place in the forest sector, such as National Forest Programmes and sets of criteria and indicators.

There has been an effort in the ECE Region to define how the forest sector can contribute to the green economy, culminating in the Rovaniemi Action Plan for the Forest Sector in a Green Economy, adopted by the ECE Committee on Forests and the Forest Industry and the FAO European Forestry Commission at "Metsä2013" in December 2013.

The Action Plan proposes that by 2020, the ECE region forest sector be applying the following principles, to achieve its overall goals:

- The forest sector uses all its resources, especially those arising from the forest, wisely and economically, while minimising waste, and maximizing recovery, reuse and recycling as much as possible. It consumes only products from forests which can demonstrate that they are managed sustainably.
- The forest sector contributes to mitigation of climate change by sequestering carbon in forests and forest products, and by substituting renewable

wood-based products and fuels for non-renewable products and fuels.

- The forest sector cares for and builds up its workforce, developing the necessary skills and significantly improving the occupational safety and health of workers and giving due consideration to gender equality.
- The forest sector makes sure that the situation of forestry education is reviewed and improved.
- The forest sector takes all externalities fully into account in policy making, introducing payment for forest

ecosystem services whenever appropriate.

- The forest sector bases its governance on evidence-based decision making and the transparent monitoring of progress towards sustainable forest management.
- The forest sector provides products and services of high user/consumer value.
- The forest sector seeks the active participation of civil society and the private sector.

The Action Plan is now in the implementation phase.

3.4 CHALLENGES AND OPPORTUNITIES FOR THE ECE REGION IN IMPLEMENTING THE GLOBAL OBJECTIVES

On the basis of the developments summarized above, as well as the outlook and policy commitments by ECE member States, a number of major challenges for the ECE Region forest sector have been identified. They are set out below. Some refer only to one Global Objective, but most, are interconnected, like the Objectives themselves, and address cross-sectoral issues, as well as governance and policy. Each challenge focuses on one idea,

although there are many interlinkages, which are not explored in detail here.

The challenges set out below are all important, there is no order of priority.

It should also be stressed that these are challenges which are difficult yet desirable to achieve; even though they are not formal commitments by ECE governments or stakeholders.

1 PROTECT THE FORESTS

Forests all over the region are threatened by biotic and abiotic causes which can cause stand destruction and carbon release. Fire damages about 7 million ha every year (6.3 million in 2005 and 7.3 million in 2010), insects damage many million more, with massive infestations in some areas. Incidents of windthrow appear to be becoming more frequent and causing greater damage. While some degree of damage by fire, insects and wind/snow is a part of natural ecosystem processes, there are indications that the severity and

frequency of these events is increasing, and may be partly attributed to climate change. Illegal logging is a problem in some parts of the ECE Region, and can also damage forests. All these types of damage reduce the forest's ability to satisfy all its functions, whether wood production, recreation or carbon storage. At present, carbon emissions from forest damage do not change the region's overall position as a forest carbon sink, but it is by no means impossible that certain parts of the region, notably boreal regions and those

vulnerable to fire, could become carbon sources, with major consequences not only for forest management, but also for the global carbon balance.

Governments and forest managers must adapt to the consequences of climate change and minimise forest damage. They must act strategically to protect the forests of the ECE Region from all threats, notably those linked to climate change, and increase the resilience of forests faced by changes which are hard to predict at present. Examples of measures to be applied after the damaging event are fire management and fighting insect infestations, or clearing windthrow. However, forest management should be geared, above all, to measures that which would prevent such damage by creating a resilient forest, for instance

through preventing invasive alien species, or choosing species in the light of possible future climatic conditions. Strategies should be adaptive; their success or failure should be monitored, and the strategies changed, if necessary, in the light of experience.

In concrete terms, governments and forest managers might:

- Review protection strategies to ensure they address likely future threats, including those linked to climate change
- Make available sufficient funds to protect the region's forests
- Develop and apply adaptive disturbance management and silvicultural strategies, modifying them if necessary, in the light of changed circumstances and the results of monitoring.

2 CONTRIBUTE TO CLIMATE CHANGE MITIGATION THROUGH CARBON SEQUESTRATION AND STORAGE IN FORESTS AND PRODUCTS, AND THROUGH SUBSTITUTION.

The forest sector can contribute to climate change mitigation in four main ways:

- **Carbon sequestration and storage in forests.** The ECE Region forests are at present a major carbon sink and this situation should be maintained or increased. The rate of carbon sequestration can be increased by expanding forest area. The carbon stock should be protected from unintended carbon releases, through fire, insects, windthrow or other causes.
- **Carbon storage in wood products.** At present the carbon store in products is estimated at 5000 million tonnes. The size of this stock can be increased, by increasing consumption of forest products, as well as by lengthening the life in service of wood products, although there are limits to this expansion, and countries should realize that under conditions of increased harvesting, the sink in the forest would decline for some time.
- **Substitution of products from non-renewable raw materials.** When products from sustainably managed forests replace products from non-renewable resources, this may reduce carbon emissions, particularly in the case of energy intensive materials such as steel or concrete.
- **Substitution of non-renewable energy sources by renewable energy derived from wood.** Substitution of non-renewable energy sources by renewable energies reduces carbon emissions. However, for both products and energy, the carbon benefit of substitution varies widely according to the pathway chosen, and must be analysed in detail using Life Cycle Assessment (LCA). The time profile of carbon emissions, with a large emission at harvest, compensated by gradual sequestration over the rotation is also an issue.

While the ECE Region forest sector is already contributing to climate change mitigation in all four ways, it is also clear that the mitigation could be significantly increased in all four areas. There are also challenges from political barriers to action—such as creating an incentive structure for carbon sequestration (e.g., creating and supporting markets for wood-based carbon)—and arising from tradeoffs between the four main directions, as well as between them and other forest functions, notably the conservation of biodiversity. The main tradeoffs can be briefly summarised as follows:

- Increased supply of wood products implies increased harvest, reducing the scope for carbon sequestration in forests.
- Intensive use of fast growing species for carbon sequestration, as well as more intensive use of forest residues, notably stumps, as raw material and for energy, is likely to have a negative effect on biodiversity.
- Increased wood energy demand may threaten the supply of raw material for products and raise their price.

The challenges facing the ECE Region forest sector with regard to climate change mitigation are to identify the best mix of measures, and then to put the agreed strategy in place. The latter may involve a significant input of political will, and financial resources, for instance to mobilise more wood from the forests, and to promote the use of products from sustainably managed forests.

3 MOBILISE SIGNIFICANTLY MORE WOOD FOR ENERGY, ON A SUSTAINABLE BASIS

At present, wood – whether directly supplied from the forest or arising in forest industries or from recovered wood products - is by far the largest source of renewable energy in the region (between 40% and 50% according to the latest Joint Wood Energy Enquiry). Most countries have policies, and policy instruments, to increase the supply and consumption of renewable energy, although national situations and priorities vary widely, with higher priority generally given to wood energy in forest-rich countries. To achieve these targets, wood supply and consumption must increase in line with other renewable energies, although at a slower rate. To reach the announced renewable energy goals, the volume of wood supplied and used as a source of energy would have to increase significantly, over a relatively short period. Outlook studies indicate that total wood supply would have to increase by 40-50% in all parts of the region to achieve the official targets for renewable energy.

To achieve these ambitious goals some or all of the following would be needed:

- Unprecedented wood mobilisation from private forests in Europe and the USA. Structural and social obstacles would have to be addressed, for instance by cooperative marketing and forest management by small scale forest owners, improved logistics for small wood, improved market transparency. This intensive wood production might have negative consequences for biodiversity.
- Using more of the tree biomass, by extracting branches, tops, smaller trees, and even stumps (below ground biomass). This implies changed harvesting methods, and certain ecological risks, notably removals of nutrients from the sites and release of carbon though increased soil disturbance.
- Eliminating any loss of wood throughout the manufacturing process, and using

all residues for raw material or energy. In many countries, there is already little waste, but improvements are certainly possible. Higher demand for wood energy from residues would increase prices for all residues, including those at present destined to particle board and other traditional industries, which have expressed strong concern about their future supply and cited the principle of “cascade use” – using wood first for material processing and only then for energy.

- Improve the recovery of wood products after use through adapted market structures, separation of different residue types, improved classification and investment in infrastructure, higher fees for landfill. Some countries have shown that it is possible to recover significant volumes of post-consumer

wood, but in most countries, this is not well developed.

In some European countries, very significant amounts of biomass, mostly wood, are being imported from overseas, driven by policies encouraging renewable energy. This biomass is being used for electricity generation in a number of very large power stations.

The policy challenge facing ECE countries is to reconcile the sometimes conflicting objectives for renewable energy, sustainable forest management, wood products industries, and trade, and, if so decided, to make a significant investment of resources and political will to mobilise significant volumes of wood for energy, without unacceptable damage to other parts of the forest sector, or the environment, inside and outside the ECE Region.

4 EXCLUDE ALL UNSUSTAINABLY PRODUCED FOREST PRODUCTS FROM ECE REGION MARKETS, WHILE HELPING COUNTRIES OUTSIDE THE REGION TO FIGHT ILLEGAL LOGGING AND OTHER UNSUSTAINABLE PRACTICES

Over the past decade, significant progress has been made in fighting illegal logging, and other unsustainable practices, inside and outside the ECE Region, with the primary aim of halting deforestation. Certification schemes are now operational all over the ECE Region, and increasingly elsewhere. Access to ECE Region markets for illegal and unsustainably produced forest products has become much more difficult, notably as a consequence of the EU Timber Regulation and the US Lacey Act. Programmes have been put in place to help developing countries meet the stricter standards. However the process is not yet complete; deforestation continues, there are still relatively few certified areas outside the ECE Region, and it is still possible to circumvent the market access regimes put in place, especially as supply chains have become longer and more complex. Imports of further processed wood based products,

produced in intermediary countries, sometimes from illegally produced wood, have been hard to regulate and control. In addition, the process of ensuring sustainability has imposed extra costs at all stages of the supply chain for wood based products. As these requirements to demonstrate sustainability often only affect wood, products based on sustainably produced wood may suffer a competitive disadvantage compared to competing products, many of which are non-renewable or produced in a non-sustainable way.

The challenges facing the region with regard to sustainably produced forest products are:

- To finish putting in place effective and fair market access regulations, removing all loopholes;

- To continue to help exporting countries in developing regions to achieve sustainable forest management, and thereby gain full access to ECE Region markets;
- To ensure that wood based products do not face unfair restrictions on consumer markets because of the cost of achieving and demonstrating sustainable forest management.

5 PROMOTE THE CONSUMPTION OF SUSTAINABLY PRODUCED FOREST PRODUCTS

Increased consumption of forest products from sustainable sources contributes to climate change mitigation, the economic sustainability of the forest sector, job creation or maintenance, and the development of the green economy. When implemented in the context of well balanced, consensus based, national forest programmes or other sustainable forest sector policies, increased consumption of sustainably produced forest products does not come at the expense of other forest functions. Certification schemes make it possible to demonstrate sustainability of forest management in the market place. Therefore the promotion of consumption of sustainably produced forest products should be a policy goal.

There are many obstacles to higher consumption of forest products, including lack of innovation and R&D in the forest sector, inappropriate or outdated technical

regulations (e.g. on fire safety or on height of timber frame buildings), as well as a misleading image of forest products, which are still often seen as being old fashioned, and perhaps environmentally negative. Efforts are in hand in many countries to address these issues, with some success, but it is acknowledged that more could be done with a greater investment of resources from the private sector, supported, when appropriate, by public funds. Civil society, including environmental NGOs, should also contribute. The promotion efforts should be devoted to communication and marketing, but also to regulatory questions.

The challenge for policy makers is to provide framework conditions and support for effective measures to promote the consumption of forest products from sustainable sources, bringing together stakeholders, and coordinating actions when necessary.

6 TAKE THE LEAD IN DEVELOPING THE GREEN ECONOMY, SHARING EXPERIENCE WITH OTHER SECTORS, AND LEARNING FROM THEM

The “Green Economy” is being developed all over the world and is calling for new approaches in every sector to improve human well-being and social equity while significantly reducing environmental risks and ecological scarcities. The forest sector already displays many green characteristics: the renewability of its raw material, the low waste and high recovery rate of its processes, the multi functionality of forests, and the emerging systems of payment for forest ecosystem services. When done correctly, forestry provides a model of humans working productively in cooperation with nature,

a model which epitomizes what the “Green Economy” is all about. However, the sector should become more “green”; indeed take the lead in certain respects. The Rovaniemi Action Plan for the Forest Sector in a Green Economy, was drawn up through a transparent international multi-stakeholder process, and was adopted by COFFI and EFC at “Metsä2013”. It is now in the implementation phase. It is consensus based and suggests a wide range of activities by all parts of the forest sector, to be undertaken on a voluntary basis through ad hoc partnerships.

The Action Plan contains hundreds of specific actions that, if undertaken by policy makers and the forest sector at large, would result in significant environmental and economic benefits. The challenges facing the ECE Region forest sector with regard to the forest sector in

the emerging green economy overlap with other challenges.

The policy challenge is to implement the Rovaniemi Action Plan to a large extent, with the active involvement of the private sector, civil society and all stakeholders.

7 PUT THE FOREST WORK FORCE ON A SUSTAINABLE BASIS, DRAMATICALLY IMPROVING SAFETY AND HEALTH OF FOREST WORKERS, AND PROVIDING NECESSARY SKILLS FOR A CHANGING WORLD

It has become apparent that the forest workforce in the region has significant problems with occupational safety and health, although experts point out that “safety and health in forest work are possible”. In addition, forest workers often have lower than average wages, relatively low social prestige, and have to work in remote areas, in uncomfortable conditions. Meanwhile, the nature of forest work is changing, becoming more technical, with increasing mechanisation, and with a higher stress on communication: forest workers need more technical skills and forest district managers must often have advanced political or consensus forming skills, as they work not only with the forest owners, but also local authorities, other sectors and a wide range of different forest users and interested publics.

Partly as a result, it has become difficult to recruit enough forest workers with appropriate skills for the changing forest

work, the average age of the work force is growing and some forest managers may be uneasy in their changing roles. This situation appears unsustainable, yet has received little policy attention, at the national or international level.

The challenges in developing a sustainable forest workforce are:

- Make forest jobs more attractive – safer, better paid, with higher social prestige, and attract younger workers;
- Adapt training and education to bring them into line with the changing requirements – mechanised harvesting, increased responsibility, more communication with forest users etc.;
- Reconsider forestry training to cover the new skills required by forest managers, and to work more closely with other disciplines.

8 CONTINUE TO HELP COUNTRIES IN OTHER REGIONS ACHIEVE SUSTAINABLE FOREST MANAGEMENT

There is clear evidence that the amount of bilateral official development assistance (ODA) supplied by ECE Region Governments has increased strongly; multilateral ODA and capacity building exercises, such as the Voluntary Partnership Agreements (VPAs) under the EU FLEGT programme are being successfully implemented. Nevertheless, tropical deforestation, illegal logging and other unsustainable practices continue in many regions. Given the importance of

tropical forests from all points of view – carbon stocks, biodiversity, livelihoods and others –, reversing deforestation must be a priority, even in those regions, like the ECE Region, where forest area is stable or expanding.

The challenge to governments and the forest sector in the ECE Region is to support and facilitate the efforts to halt deforestation, through financial and technical assistance,

sharing of experience and capacity building, increasing the effectiveness of the funds supplied, and in particular to

maintain or increase levels of funding, whether bilateral or multilateral ODA or private investment.

9 SEEK MECHANISMS TO FINANCE FOREST FUNCTIONS ON A FAIR AND SUSTAINABLE BASIS, FOR EXAMPLE THROUGH VALUATION OF FOREST ECOSYSTEM SERVICES AND PAYMENT FOR ECOSYSTEM SERVICES

Forest policy recognises the multi-functional nature of forest management, and all through the ECE Region aims at a balance between the functions – wood supply, biodiversity, protection, recreation and many others. However, many forest functions do not have recognised monetary value, and forest owners receive no income from them. This may lead to distortion of management choices, as owners give priority to those functions which bring income. To a certain extent, these reductions in livelihoods are compensated by public subsidies of various sorts, but the public budget rarely targets its assistance on specific functions. Payment for Ecosystem Services (PES) systems are being put in place, but are not yet widespread. Progress is being made, both in the evaluation of forest functions, and in payment for ecosystem services, but it cannot yet be demonstrated that forest functions are financed on an equitable and efficient basis, taking account of the interests of forest owners, society and other stakeholders. One consequence of this may be that expenditures for forest related activities are unfairly disadvantaged relative to competing requests for public funding.

The theoretical and practical problems of evaluating forest functions, and putting in place PES systems are large: measuring

the flows of benefits, assigning a monetary value to them, quantifying tradeoffs between the supply of different benefits from a multi-functional forest which follows natural ecosystem processes, identifying the costs associated to each function, and fairly assigning costs between society, owners and beneficiaries all present major challenges. Putting them into practice can be expensive and complex. However, if this is not done, the present lack of transparency and possible misallocation of resources will continue. This could harm the balanced decision making which underlies the concept of sustainable forest management. A pragmatic and innovative approach will be necessary to make progress in this area. Success, especially in the context of a green economy, would raise the profile of the forest sector and encourage it to make a broader contribution to society as a whole.

The challenge facing ECE Region governments, forest owners and forest stakeholders is to develop and establish, in an equitable and efficient way, a transparent and objective system of evaluating non-wood forest functions and, when possible and appropriate, an institutional and governance system of financing their supply through payment for ecosystem services.

10 BUILD CAPACITY THROUGHOUT THE ECE REGION

Many ECE Region countries are advanced economies, but there are several, mostly in the Balkans, around the Caucasus and in central Asia, which face major challenges of development, including for the forest

sector. With a few exceptions, the forest sector in these countries accounts for only a small part of the total economy. Many of them have low forest cover (the Balkan countries are an exception to this). Most

of them are dependent on imports for their supply of forest products. Almost all countries in this region were formerly part of the USSR or Yugoslavia so they are in a transition process with far-reaching consequences for their economies and societies.

The main issues and challenges for the forest sector in the region were identified by the Lviv Forum on “Forests in a Green Economy” for Eastern Europe, Northern and Central Asia in 2012. Although the situations vary widely, frequent problems are:

- Remoteness and lack of infrastructure.
- Transition and changes in structures and society, including the need to improve governance.
- Illegal logging.
- Lack of and threat to protective functions because of low forest cover.
- Lack of priority for the forest sector in national development plans.

11 DEVELOP A CULTURE OF INNOVATION, IN THE FACE OF STRUCTURAL CHANGE

The outlook studies stress that structural change is taking place in many areas, including the global economy, trade patterns, energy, the climate, technology, public taste, demographics and others. Many of these changes will influence trends in the forest sector, although the sector has little influence on them. The actors of the forest sector – private and public forest owners and managers, industries, traders, as well as policy makers – must function in an increasingly competitive and rapidly changing political, economic and technological environment, sometimes dominated by large, extremely dynamic, enterprises with a culture of rapid and successful innovation. To survive and prosper, forest sector actors must remain, or become, competitive, developing innovative solutions to new challenges. Innovation

The Forum adopted a Vision and message, with ten main points, laying out the broad lines of moving towards sustainable forest management in these parts of the ECE Region.

The challenge for the countries of Central Asia, the Caucasus and some countries of the former Yugoslavia is to put their forest sectors on the path to sustainable forest management. The challenge for other ECE countries is to support them in this effort. A necessary first step is to ensure that national development plans recognise the importance of forest sector issues. Governments and society as a whole should recognise both the dangers from unsustainable forest management and the potential contribution of a sustainably managed forest sector to social and economic development. Sustainable forest management should be addressed at the highest policy level, because of, not despite, the low forest cover in many of these countries.

is needed in many fields, including forest management, product design, business processes, and communication. At the same time, the full commitment to long term sustainability, which strongly marks the forest sector, must be maintained - indeed, this is one area that marks the sector as particularly forward looking and thus presents an important marketing opportunity.

Developing a culture of innovation has many components, including access to finance, technology, infrastructure, an educated workforce and clusters of relevant skills, as well as the necessary entrepreneurial attitude. Governments, regional authorities and trade associations can provide some of the necessary framework conditions, but the initiative has to come from market actors,

whether new entrepreneurs or established managers or owners.

The policy challenge for the development of a culture of innovation is to put in place the necessary framework

conditions, such as finance, skills and workforce, and to promote the necessary innovative spirit, while maintaining the commitment to sustainable forest management.

12 ADDRESS THE SOCIAL AND ECONOMIC PROBLEMS OF FOREST DEPENDENT PEOPLE IN THE ECE REGION – REMOTE RURAL COMMUNITIES, INDIGENOUS PEOPLES AND FOREST OWNERS

Although most ECE countries are relatively prosperous advanced economies, many have pockets of deprivation, marked by poverty, poor living conditions and social problems, including violence and alcoholism. This situation has been exacerbated by the move towards greater inequalities in many countries. Some of these pockets of deprivation are in forested areas, such as remote rural communities, dependent on income from logging or forest industries, or indigenous peoples living in forest areas. Low revenue from forestry and closures of local mills have exacerbated these problems. This issue affects many parts of the region, but especially the large forest areas of ECE West and East, where climate and geography exacerbate the problem. Possible remedies include infrastructure development (transport, communication), targeted subsidies to communities or local industries for job creation, support to small and medium size enterprises, vocational training and other adapted measures, entrepreneurship. Above all, the forest and forest industries should be managed with the interests of the local communities in mind, and structural changes, when necessary, should be managed gradually and humanely.

Many indigenous peoples, notably in North America, have unresolved claims on large

forest areas. Sustainable resolution of these issues should preferably include final agreement on these claims although this has proved extremely hard to achieve in the past.

A challenge of a different nature comes from the millions of private forest owners whose holdings are below the critical size for economic management. Many of these forest owners are not able to undertake rational or sustainable forest management, unless they are able to support their forest related activities with income from other sources. As a result, many forest owners have unsatisfactory revenues and it has not been possible to mobilise potential wood supply. Government support and cooperatives of forest owners are working towards improving the situation, but much remains to be done.

The challenge with regard to the social and economic problems of forest dependent people is to ensure that the forest is part of the solution to the problems of isolated poor rural communities in forest areas, not a factor exacerbating their isolation and poverty. Governments, in consultation with the local communities, forest owners and other stakeholders, should put in place programmes to address these issues, so that ECE Region forests can make a positive contribution to the social and economic problems of forest dependent people in the region. Other stakeholders, notably state

forest organisations and forest industries should also take the needs of forest

dependent people into account in their own activities.

13 MAINTAIN AND IMPROVE FOREST BIODIVERSITY, THROUGH PROTECTED AREAS AND ACTIVE MANAGEMENT

The area of forest in the ECE Region protected for biodiversity conservation has been increasing steadily, and integrated forest management, whereby conservation functions are integrated into management along with the other forest functions, is increasingly applied. The levels of deadwood in ECE forests are rising steadily. However, the Aichi targets for biodiversity conservation have not yet been reached in all countries of the region, and many forest dependent species are still threatened. It is also not yet clear to which extent the different forest ecosystem types are properly protected, something which is not demonstrated by a national average. There is clearly still the potential to improve forest biodiversity in all parts of the region, by expanding protected areas, where necessary, and by expanding the use of integrated management in forests outside protected areas.

The obstacles to improving forest biodiversity are financial, and regulatory, notably with respect to improving biodiversity on privately owned forests. It is also necessary to build consensus about which areas should be managed exclusively for biodiversity, and which through integrated management.

The challenge with regard to biodiversity is ensure that international commitments, notably the Aichi targets, are met, that all forest ecosystem types are properly covered in protected area networks, and that biodiversity is maintained and improved also on multi-functional forest land. It is also a challenge to monitor progress with regard to forest biodiversity, and to base policies on a wide consensus of stakeholders, some of whom have contradictory interests, especially in a context of restrictions on public spending, which applies across the whole ECE Region.



ANNEX 1: COUNTRY GROUPS⁴⁷

ECE East: Belarus, Republic of Moldova, Russian Federation, Ukraine (4 countries)

ECE Central: Albania, Andorra, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, The former Yugoslav Republic of Macedonia, United Kingdom of Great Britain and Northern Ireland (40 countries)

ECE South-East: Armenia, Azerbaijan, Georgia, Israel, Kazakhstan, Kyrgyzstan, Tajikistan, Turkey, Turkmenistan, Uzbekistan (10 countries)

ECE West: Canada, United States of America (2 countries)

⁴⁷ Country groups reflect the similar situation of forests and their management and are not intended to represent any existing or possible political or institutional settings.

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CHAPTER 2 PROGRESS TOWARDS THE GLOBAL OBJECTIVES OBJECTIVE 1

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ANNEX 3

SOURCE DATA TABLES

Table 1. Basic country data

Table 2. Forest area

Table 3. Growing stock

Table 4. Carbon stock

Table 5. Land Use, Land-Use Change and Forestry (LULUCF)

Table 6. Increment and fellings

Table 7. Wood removals

Table 8. Disturbances affecting forest health and vitality

Table 9. Ownership and management

Table 10. Contribution of the forest sector to the GDP

Table 11. Employment in the forest sector

Table 12. Trade in wood

Table 13. Biological diversity

Table 14. Certification

ANNEX 3: SOURCE DATA TABLES

Table 1a
Basic country data

Country	Land area (1,000 ha)	Forest and other wooded land (1,000 ha)				Forest and Other wooded land in percent of land area	
		2015	2000	2005	2010	2015	2010
Belarus	20,748	9,190.7	8,935.3	9,170.6	9,228.8	44	44
Moldova	3,287	428.5	428.5	428.5	428.5	13	13
Russian Federation	1,637,687	880,875.1	881,959.1	890,948.0	889,855.1	54	54
Ukraine	57,938	9,551.0	9,616.0	9,574.0	9,683.0	17	17
ECE East	1,719,660	900,045.3	900,938.9	910,121.1	909,195.4	53	53
Albania	2,875	1,030.5	1,043.0	1,043.3	1,237.2	36	43
Andorra	45	16.0	16.0	16.0	16.0	36	36
Austria	8,245	3,955.0	3,978.0	4,000.0	4,022.0	49	49
Belgium	3,028	694.4	704.2	714.0	719.1	24	24
Bosnia and Herzegovina	5,120	2,734.0	2,734.0	2,778.3	2,799.2	54	55
Bulgaria	10,864	3,480.0	3,677.0	3,761.0	3,845.0	35	35
Croatia	5,592	2,300.0	2,387.0	2,474.0	2,491.0	44	45
Cyprus	924	385.5	386.7	386.1	386.2	42	42
Czech Republic	7,722	2,637.3	2,647.4	2,657.4	2,667.4	34	35
Denmark	4,243	721.0	600.0	634.0	657.0	15	15
Estonia	4,239	2,450.7	2,465.0	2,453.0	2,455.5	58	58
Finland	30,409	23,283.0	23,300.0	23,019.0	23,019.0	76	76
France	54,919	17,093.0	16,748.0	17,163.0	17,579.0	31	32
Germany	34,877	11,354.0	11,384.0	11,409.0	11,419.0	33	33
Greece	12,890	6,525.0	6,532.0	6,539.0	6,539.0	51	51
Hungary	8,961	1,907.0	1,983.0	2,046.4	2,190.4	23	24
Iceland	10,025	158.8	171.1	182.0	193.3	2	2
Ireland	6,888	684.0	745.0	772.9	801.2	11	12
Italy	29,411	10,019.0	10,467.0	10,789.0	11,110.0	37	38
Latvia	6,229	3,364.0	3,415.0	3,467.0	3,468.0	56	56
Liechtenstein	16	7.4	7.4	7.4	7.4	46	46
Lithuania	6,268	2,103.0	2,194.0	2,254.0	2,284.0	36	36
Luxembourg	259	88.2	88.2	88.2	88.2	34	34
Malta	32	0.3	0.3	0.3	0.3	1	1
Monaco	2	0	0	0	0	0	0
Montenegro	1,345	744.1	744.1	964.3	964.3	72	72
Netherlands	3,388	360.0	365.0	373.0	376.0	11	11
Norway	30,427	13,982.0	13,962.0	14,043.0	14,124.0	46	46
Poland	30,622	9,059.0	9,200.0	9,329.0	9,435.0	30	31
Portugal	9,068	4,560.6	4,577.2	4,742.2	4,907.2	52	54
Romania	22,998	6,600.0	6,743.0	6,919.0	6,951.0	30	30
San Marino	6	0	0	0	0	0	0
Serbia	8,836	2,981.0	2,997.0	3,123.0	3,228.0	35	37
Slovakia	4,810	1,921.0	1,932.0	1,938.9	1,940.0	40	40
Slovenia	2,014	1,271.0	1,272.0	1,272.0	1,271.0	63	63
Spain	49,919	27,337.0	27,540.8	27,525.4	27,626.7	55	55
Sweden	41,033	30,595.0	30,762.0	30,505.0	30,505.0	74	74
Switzerland	4,000	1,257.0	1,284.0	1,304.0	1,324.0	33	33
The former Yugoslav Republic of Macedonia	2,543	1,101.0	1,118.0	1,103.4	1,130.5	43	44
United Kingdom	24,250	2,974.0	3,041.0	3,079.0	3,164.0	13	13
ECE Central	489,341	201,733.6	203,211.2	204,875.3	206,941.2	42	42
Armenia	2,820	349.0	328.0	307.0	307.0	11	11
Azerbaijan	8,263	990.0	990.0	990.0	990.0	12	12
Georgia	6,949	2,832.7	2,798.4	2,829.3	2,829.3	41	41
Israel	2,164	186.0	188.0	187.0	225.0	9	10
Kazakhstan	269,970	18,130.0	18,959.0	19,788.0	19,788.0	7	7
Kyrgyzstan	19,995	1,161.3	1,182.1	1,343.9	1,343.9	7	7
Tajikistan	14,210	552.0	552.0	552.0	554.0	4	4
Turkey	76,963	20,862.0	21,248.5	21,537.1	21,862.5	28	28
Turkmenistan	46,993	4,127.0	4,127.0	4,127.0	4,127.0	9	9
Uzbekistan	42,540	4,806.7	4,199.0	4,149.5	4,149.5	10	10
ECE South-East	490,867	53,996.7	54,572.0	55,810.8	56,176.2	11	11
Canada	998,467	388,668.0	388,442.0	388,168.0	387,935.0	39	39
United States of America	916,193	319,113.0	320,209.0	324,682.0	331,374.0	35	36
ECE West	1,914,660	707,781.0	708,651.0	712,850.0	719,309.0	37	38
ECE Total	4,614,528	1,863,556.6	1,867,373.1	1,883,657.2	1,891,621.8	41	41
EU-28	424,102	177,721.9	179,134.7	180,310.7	181,917.2	43	43

UN Statistics Division, FAO/FRA (2000, 2005, 2010), Joint FOREST EUROPE/UNECE/FAO pan-European reporting (2011, 2014), national contacts and sources, secretariat's estimates - for more detailed information about sources of data and methods of estimation see web-based version.

Population total (1,000 inhabitants)				Forest and other wooded land per inhabitant (ha/inhabitant)				Country
2000	2005	2010	2012	2000	2005	2010	2015	
10,274	9,832	9,679	9,465	0.9	0.9	0.9	1.0	Belarus
4,380	3,595	3,562	3,560	0.1	0.1	0.1	0.1	Moldova
147,196	142,814	141,394	143,056	6.0	6.2	6.3	6.2	Russian Federation
50,658	48,008	45,992	45,634	0.2	0.2	0.2	0.2	Ukraine
212,508	204,249	200,627	201,715	4.2	4.4	4.5	4.5	ECE East
3,063	3,020	2,919	2,896	0.3	0.3	0.4	0.4	Albania
75	66	84	77	0.2	0.2	0.2	0.2	Andorra
8,177	8,115	8,337	8,466	0.5	0.5	0.5	0.5	Austria
10,239	10,446	10,840	11,220	0.1	0.1	0.1	0.1	Belgium
3,839	3,836	3,773	3,837	0.7	0.7	0.7	0.7	Bosnia and Herzegovina
8,279	7,780	7,593	7,305	0.4	0.5	0.5	0.5	Bulgaria
4,477	4,508	4,423	4,268	0.5	0.5	0.6	0.6	Croatia
778	776	862	862	0.5	0.5	0.4	0.4	Cyprus
10,262	10,183	10,319	10,511	0.3	0.3	0.3	0.3	Czech Republic
5,282	5,397	5,458	5,587	0.1	0.1	0.1	0.1	Denmark
1,412	1,345	1,341	1,340	1.7	1.8	1.8	1.8	Estonia
5,165	5,215	5,304	5,401	4.5	4.5	4.3	4.3	Finland
58,886	59,991	62,036	63,556	0.3	0.3	0.3	0.3	France
82,178	82,631	82,264	81,932	0.1	0.1	0.1	0.1	Germany
10,626	11,075	11,137	11,290	0.6	0.6	0.6	0.6	Greece
10,076	10,072	10,012	9,919	0.2	0.2	0.2	0.2	Hungary
279	290	315	321	0.6	0.6	0.6	0.6	Iceland
3,705	4,019	4,437	4,437	0.2	0.2	0.2	0.2	Ireland
57,343	57,573	59,604	60,851	0.2	0.2	0.2	0.2	Italy
2,389	2,303	2,259	2,032	1.4	1.5	1.5	1.7	Latvia
32	34	36	36	0.2	0.2	0.2	0.2	Liechtenstein
3,682	3,439	3,321	3,008	0.6	0.6	0.7	0.8	Lithuania
450	450	481	525	0.2	0.2	0.2	0.2	Luxembourg
386	401	407	418	0	0	0	0	Malta
33	33	33	33	0	0	0	0	Monaco
622	622	622	622	1.2	1.2	1.5	1.5	Montenegro
15,735	16,250	16,528	16,730	0	0	0	0	Netherlands
4,478	4,606	4,858	5,172	3.1	3.0	2.9	2.7	Norway
38,740	38,160	38,104	38,538	0.2	0.2	0.2	0.2	Poland
9,873	10,436	10,677	10,542	0.5	0.4	0.4	0.5	Portugal
22,402	21,858	21,361	21,356	0.3	0.3	0.3	0.3	Romania
26	28	31	33	0	0	0	0	San Marino
8,152	8,152	7,291	7,164	0.4	0.4	0.4	0.5	Serbia
5,382	5,390	5,400	5,408	0.4	0.4	0.4	0.4	Slovakia
1,989	1,995	2,015	2,057	0.6	0.6	0.6	0.6	Slovenia
39,634	41,286	44,486	46,163	0.7	0.7	0.6	0.6	Spain
8,892	8,985	9,205	9,519	3.4	3.4	3.3	3.2	Sweden
7,344	7,382	7,541	7,996	0.2	0.2	0.2	0.2	Switzerland
2,011	2,062	2,041	2,061	0.5	0.5	0.5	0.5	The former Yugoslav Republic of Macedonia
58,886	60,413	62,759	64,106	0.1	0.1	0	0	United Kingdom
515,280	520,623	530,514	537,596	0.4	0.4	0.4	0.4	ECE Central
3,525	3,050	3,077	3,274	0.1	0.1	0.1	0.1	Armenia
7,697	8,280	8,731	9,296	0.1	0.1	0.1	0.1	Azerbaijan
5,006	4,521	4,307	4,491	0.6	0.6	0.7	0.6	Georgia
6,101	6,798	7,051	7,901	0	0	0	0	Israel
16,269	14,958	15,521	16,673	1.1	1.3	1.3	1.2	Kazakhstan
4,669	5,099	5,414	5,352	0.2	0.2	0.2	0.3	Kyrgyzstan
6,127	6,806	7,627	8,161	0.1	0.1	0.1	0.1	Tajikistan
67,804	71,727	73,723	78,152	0.3	0.3	0.3	0.3	Turkey
4,384	4,931	5,044	5,044	0.9	0.8	0.8	0.8	Turkmenistan
23,942	25,930	27,191	29,555	0.2	0.2	0.2	0.1	Uzbekistan
145,524	152,100	157,686	167,900	0.4	0.4	0.4	0.3	ECE South-East
30,686	32,242	34,005	34,005	12.7	12.0	11.4	11.4	Canada
276,218	293,507	311,666	313,914	1.2	1.1	1.0	1.1	United States of America
306,904	325,749	345,671	347,919	2.3	2.2	2.1	2.1	ECE West
1,180,215	1,202,721	1,234,499	1,255,130	1.6	1.6	1.5	1.5	ECE Total
485,325	490,492	500,970	507,347	0.4	0.4	0.4	0.4	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 1b
Basic country data

Country	Urban population (% and absolute number)					
	2000		2005		2010	
	%	number (1,000)	%	number (1,000)	%	number (1,000)
Belarus	74	7,572	71	7,006	73	7,066
Moldova	55	2,387	55	1,959	55	1,941
Russian Federation	77	113,783	73	104,668	73	103,218
Ukraine	72	36,474	67	32,309	68	31,275
ECE East	75	160,215	71	145,943	72	143,499
Albania	39	1,294	44	1,411	47	1,530
Andorra	95	71	89	59	89	75
Austria	65	5,282	66	5,340	67	5,586
Belgium	97	10,262	97	10,117	97	10,272
Bosnia and Herzegovina	43	1,639	45	1,720	47	1,773
Bulgaria	70	5,770	70	5,458	71	5,391
Croatia	57	2,565	59	2,680	57	2,521
Cyprus	56	437	69	538	70	603
Czech Republic	66	6,783	74	7,580	73	7,533
Denmark	86	4,521	85	4,612	87	4,748
Estonia	74	1,045	70	935	69	925
Finland	65	3,337	61	3,177	63	3,342
France	75	44,400	76	45,887	77	47,768
Germany	87	71,741	88	72,955	74	60,875
Greece	60	6,365	61	6,770	61	6,794
Hungary	67	6,701	66	6,601	67	6,708
Iceland	92	257	93	269	92	290
Ireland	58	2,160	60	2,417	61	2,707
Italy	67	38,362	67	38,839	68	40,531
Latvia	74	1,768	66	1,521	68	1,536
Liechtenstein	19	6	14	5	14	5
Lithuania	74	2,728	67	2,293	67	2,225
Luxembourg	92	414	92	414	82	394
Malta	90	348	92	368	94	383
Monaco	0	0	0	0	100	33
Montenegro	60	373	60	373	60	373
Netherlands	89	14,051	66	10,777	82	13,553
Norway	74	3,408	80	3,577	77	3,840
Poland	65	25,258	62	23,640	61	23,243
Portugal	38	3,702	55	5,752	59	6,299
Romania	58	12,926	55	11,948	54	11,535
San Marino	96	25	93	26	93	29
Serbia	52	4,255	52	4,255	52	3,821
Slovakia	61	3,261	58	3,112	56	3,024
Slovenia	52	1,040	51	1,013	48	967
Spain	77	30,677	77	31,617	77	34,254
Sweden	83	7,407	83	7,494	84	7,732
Switzerland	62	4,575	68	4,985	73	5,505
The former Yugoslav Republic of Macedonia	62	1,239	60	1,229	67	1,367
United Kingdom	89	52,585	89	53,871	90	56,484
ECE Central	74	383,042	74	385,637	73	386,575
Armenia	70	2,457	64	1,960	64	1,969
Azerbaijan	57	4,380	50	4,141	52	4,540
Georgia	60	3,014	52	2,338	53	2,283
Israel	91	5,558	92	6,232	92	6,487
Kazakhstan	61	9,973	56	8,363	58	9,002
Kyrgyzstan	40	1,858	34	1,727	36	1,949
Tajikistan	33	1,623	25	2,042	26	1,983
Turkey	74	50,243	67	47,892	69	50,869
Turkmenistan	45	1,990	46	2,248	49	2,472
Uzbekistan	42	10,080	37	9,472	37	10,061
ECE South-East	63	91,175	57	84,373	58	89,631
Canada	77	23,908	81	25,351	80	27,204
United States of America	77	212,688	80	236,068	82	255,566
ECE West	77	236,596	80	261,418	82	282,770
ECE Total	74	871,028	73	877,372	74	902,476
EU-28	75	365,900	76	367,728	74	367,934

UN Statistics Division, FAO/FRA (2000, 2005, 2010), Joint FOREST EUROPE/UNECE/FAO pan-European reporting (2011, 2014), national contacts and sources, secretariat's estimates - for more detailed information about sources of data and methods of estimation see web-based version.

GNP per capita (USD)			Country
2000	2005	2012	
1,380	2,820	5,990	Belarus
370	890	1,820	Moldova
1,710	4,460	10,010	Russian Federation
700	1,540	2,990	Ukraine
1,426	3,632	8,061	ECE East
1,170	2,710	4,450	Albania
18,570	31,310	31,310	Andorra
26,690	38,500	49,180	Austria
25,980	37,630	47,200	Belgium
1,450	2,940	4,680	Bosnia and Herzegovina
1,680	3,700	6,630	Bulgaria
5,290	9,870	13,740	Croatia
13,440	21,490	28,280	Cyprus
6,320	12,380	19,210	Czech Republic
32,660	49,620	60,820	Denmark
4,150	9,670	14,390	Estonia
26,420	40,090	49,320	Finland
25,150	36,010	43,790	France
26,170	35,880	44,780	Germany
13,180	22,510	27,580	Greece
4,650	10,410	13,050	Hungary
31,540	50,730	36,740	Iceland
23,920	43,570	43,760	Ireland
21,820	32,390	37,690	Italy
3,220	6,950	12,680	Latvia
79,080	92,660	92,660	Liechtenstein
3,200	7,580	12,260	Lithuania
39,100	70,340	69,340	Luxembourg
10,510	14,380	20,090	Malta
90,840	128,380	128,380	Monaco
3,650	3,650	6,890	Montenegro
28,470	42,010	53,320	Netherlands
35,860	62,760	86,830	Norway
4,690	7,400	12,580	Poland
12,140	18,550	22,930	Portugal
1,700	3,920	8,430	Romania
41,080	41,080	41,080	San Marino
1,530	3,630	5,850	Serbia
5,520	11,330	17,130	Slovakia
11,350	18,460	24,540	Slovenia
15,900	25,930	32,130	Spain
31,220	45,350	53,810	Sweden
43,490	61,550	77,360	Switzerland
1,800	2,830	4,570	The former Yugoslav Republic of Macedonia
27,230	41,010	40,470	United Kingdom
19,381	29,068	35,371	ECE Central
660	1,520	3,370	Armenia
610	1,270	5,370	Azerbaijan
750	1,360	2,680	Georgia
18,790	21,220	29,480	Israel
1,260	2,950	7,440	Kazakhstan
280	450	850	Kyrgyzstan
170	320	730	Tajikistan
4,190	6,520	9,980	Turkey
600	1,600	4,070	Turkmenistan
630	530	1,300	Uzbekistan
3,093	4,625	7,572	ECE South-East
22,530	33,950	44,450	Canada
35,740	46,220	49,110	United States of America
34,419	45,006	48,652	ECE West
18,050	25,974	31,101	ECE Total
19,497	29,170	35,231	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 2a
Forest area

Country	Forest (1,000 ha)				Other wooded land (1,000 ha)			
	2000	2005	2010	2015	2000	2005	2010	2015
Belarus	8,275.7	8,436.0	8,630.0	8,633.5	915.0	499.3	540.6	595.3
Moldova	428.5	428.5	428.5	428.5	0	0	0	0
Russian Federation	809,268.5	808,790.0	815,136.0	814,930.5	71,606.6	73,169.1	75,812.0	74,924.6
Ukraine	9,510.0	9,575.0	9,548.0	9,657.0	41.0	41.0	26.0	26.0
ECE East	827,482.7	827,229.5	833,742.5	833,649.5	72,562.6	73,709.4	76,378.6	75,545.9
Albania	769.0	782.0	776.3	785.0	261.5	261.0	267.0	452.2
Andorra	16.0	16.0	16.0	16.0	0	0	0	0
Austria	3,838.0	3,851.0	3,860.0	3,869.0	117.0	127.0	140.0	153.0
Belgium	667.3	674.2	681.2	683.4	27.1	30.0	32.8	35.7
Bosnia and Herzegovina	2,185.0	2,185.0	2,102.7	2,115.0	549.0	549.0	675.6	684.2
Bulgaria	3,375.0	3,651.0	3,737.0	3,823.0	105.0	26.0	24.0	22.0
Croatia	1,885.0	1,903.0	1,920.0	1,922.0	415.0	484.0	554.0	569.0
Cyprus	171.6	172.9	172.8	172.7	213.9	213.9	213.3	213.5
Czech Republic	2,637.3	2,647.4	2,657.4	2,667.4	0	0	0	0
Denmark	585.0	558.0	587.0	612.0	136.0	42.0	47.0	45.0
Estonia	2,243.0	2,252.0	2,233.9	2,232.0	207.7	213.0	219.0	223.6
Finland	22,459.0	22,162.0	22,218.0	22,218.0	824.0	1,138.0	801.0	801.0
France	15,289.0	15,861.0	16,424.0	16,989.0	1,804.0	887.0	739.0	590.0
Germany	11,354.0	11,384.0	11,409.0	11,419.0	0	0	0	0
Greece	3,601.0	3,752.0	3,903.0	3,903.0	2,924.0	2,780.0	2,636.0	2,636.0
Hungary	1,907.0	1,983.0	2,046.4	2,069.1	0	0	0	121.3
Iceland	28.8	36.5	42.8	49.2	129.9	134.6	139.2	144.2
Ireland	635.0	695.0	725.6	754.0	49.0	50.0	47.2	47.2
Italy	8,369.0	8,759.0	9,028.0	9,297.0	1,650.0	1,708.0	1,761.0	1,813.0
Latvia	3,241.0	3,297.0	3,354.0	3,356.0	123.0	118.0	113.0	112.0
Liechtenstein	6.9	6.9	6.9	6.9	0.5	0.5	0.5	0.5
Lithuania	2,020.0	2,121.0	2,170.0	2,180.0	83.0	73.0	84.0	104.0
Luxembourg	86.8	86.8	86.8	86.8	1.4	1.4	1.4	1.4
Malta	0.3	0.3	0.3	0.3	0	0	0	0
Monaco	0	0	0	0	0	0	0	0
Montenegro	626.2	626.2	826.8	826.8	117.8	117.8	137.5	137.5
Netherlands	360.0	365.0	373.0	376.0	0	0	0	0
Norway	12,113.0	12,092.0	12,102.0	12,112.0	1,869.0	1,870.0	1,941.0	2,012.0
Poland	9,059.0	9,200.0	9,329.0	9,435.0	0	0	0	0
Portugal	3,342.8	3,296.0	3,239.1	3,182.1	1,217.9	1,281.2	1,503.1	1,725.1
Romania	6,366.0	6,391.0	6,515.0	6,861.0	234.0	352.0	404.0	90.0
San Marino	0	0	0	0	0	0	0	0
Serbia	2,460.0	2,476.0	2,713.0	2,720.0	521.0	521.0	410.0	508.0
Slovakia	1,921.0	1,932.0	1,938.9	1,940.0	0	0	0	0
Slovenia	1,233.0	1,243.0	1,247.0	1,248.0	38.0	29.0	25.0	23.0
Spain	16,976.9	17,282.1	18,247.2	18,417.9	10,360.0	10,258.7	9,278.2	9,208.8
Sweden	28,163.0	28,218.0	28,073.0	28,073.0	2,432.0	2,544.0	2,432.0	2,432.0
Switzerland	1,194.0	1,217.0	1,235.0	1,254.0	63.0	67.0	69.0	70.0
The former Yugoslav Republic of Macedonia	958.0	975.0	960.4	987.5	143.0	143.0	143.0	143.0
United Kingdom	2,954.0	3,021.0	3,059.0	3,144.0	20.0	20.0	20.0	20.0
ECE Central	175,096.9	177,171.2	180,017.5	181,803.0	26,636.7	26,040.0	24,857.8	25,138.1
Armenia	304.0	283.0	262.0	262.0	45.0	45.0	45.0	45.0
Azerbaijan	936.0	936.0	936.0	936.0	54.0	54.0	54.0	54.0
Georgia	2,760.6	2,772.5	2,822.4	2,822.4	72.1	25.9	6.9	6.9
Israel	153.0	155.0	154.0	165.0	33.0	33.0	33.0	60.0
Kazakhstan	3,365.0	3,337.0	3,309.0	3,309.0	14,765.0	15,622.0	16,479.0	16,479.0
Kyrgyzstan	858.3	869.3	953.8	953.8	303.0	312.8	390.1	390.1
Tajikistan	410.0	410.0	410.0	412.0	142.0	142.0	142.0	142.0
Turkey	10,183.0	10,662.0	11,202.8	11,943.0	10,679.0	10,586.5	10,334.3	9,919.5
Turkmenistan	4,127.0	4,127.0	4,127.0	4,127.0	0	0	0	0
Uzbekistan	3,212.0	3,295.0	3,275.5	3,275.5	1,594.7	904.0	874.0	874.0
ECE South-East	26,308.9	26,846.8	27,452.5	28,205.7	27,687.8	27,725.2	28,358.3	27,970.5
Canada	347,802.0	347,576.0	347,302.0	347,069.0	40,866.0	40,866.0	40,866.0	40,866.0
United States of America	303,536.0	304,757.0	308,720.0	310,095.0	15,577.0	15,452.0	15,962.0	21,279.0
ECE West	651,338.0	652,333.0	656,022.0	657,164.0	56,443.0	56,318.0	56,828.0	62,145.0
ECE Total	1,680,226.5	1,683,580.5	1,697,234.6	1,700,822.2	183,330.1	183,792.6	186,422.7	190,799.6
EU-28	154,740.0	156,758.7	159,235.7	160,930.7	22,981.9	22,376.0	21,075.0	20,986.6

Data sources: FAO/FRA (2000, 2005, 2010), Joint FOREST EUROPE/UNECE/FAO pan-European reporting (2011, 2014), national contacts and sources, secretariat's estimates - for more detailed information about sources of data and methods of estimation see web-based version.

Forest and other wooded land (1,000 ha)				Country
2000	2005	2010	2015	
9,190.7	8,935.3	9,170.6	9,228.8	Belarus
428.5	428.5	428.5	428.5	Moldova
880,875.1	881,959.1	890,948.0	889,855.1	Russian Federation
9,551.0	9,616.0	9,574.0	9,683.0	Ukraine
900,045.3	900,938.9	910,121.1	909,195.4	ECE East
1,030.5	1,043.0	1,043.3	1,237.2	Albania
16.0	16.0	16.0	16.0	Andorra
3,955.0	3,978.0	4,000.0	4,022.0	Austria
694.4	704.2	714.0	719.1	Belgium
2,734.0	2,734.0	2,778.3	2,799.2	Bosnia and Herzegovina
3,480.0	3,677.0	3,761.0	3,845.0	Bulgaria
2,300.0	2,387.0	2,474.0	2,491.0	Croatia
385.5	386.7	386.1	386.2	Cyprus
2,637.3	2,647.4	2,657.4	2,667.4	Czech Republic
721.0	600.0	634.0	657.0	Denmark
2,450.7	2,465.0	2,453.0	2,455.5	Estonia
23,283.0	23,300.0	23,019.0	23,019.0	Finland
17,093.0	16,748.0	17,163.0	17,579.0	France
11,354.0	11,384.0	11,409.0	11,419.0	Germany
6,525.0	6,532.0	6,539.0	6,539.0	Greece
1,907.0	1,983.0	2,046.4	2,190.4	Hungary
158.8	171.1	182.0	193.3	Iceland
684.0	745.0	772.9	801.2	Ireland
10,019.0	10,467.0	10,789.0	11,110.0	Italy
3,364.0	3,415.0	3,467.0	3,468.0	Latvia
7.4	7.4	7.4	7.4	Liechtenstein
2,103.0	2,194.0	2,254.0	2,284.0	Lithuania
88.2	88.2	88.2	88.2	Luxembourg
0.3	0.3	0.3	0.3	Malta
0	0	0	0	Monaco
744.1	744.1	964.3	964.3	Montenegro
360.0	365.0	373.0	376.0	Netherlands
13,982.0	13,962.0	14,043.0	14,124.0	Norway
9,059.0	9,200.0	9,329.0	9,435.0	Poland
4,560.6	4,577.2	4,742.2	4,907.2	Portugal
6,600.0	6,743.0	6,919.0	6,951.0	Romania
0	0	0	0	San Marino
2,981.0	2,997.0	3,123.0	3,228.0	Serbia
1,921.0	1,932.0	1,938.9	1,940.0	Slovakia
1,271.0	1,272.0	1,272.0	1,271.0	Slovenia
27,337.0	27,540.8	27,525.4	27,626.7	Spain
30,595.0	30,762.0	30,505.0	30,505.0	Sweden
1,257.0	1,284.0	1,304.0	1,324.0	Switzerland
1,101.0	1,118.0	1,103.4	1,130.5	The former Yugoslav Republic of Macedonia
2,974.0	3,041.0	3,079.0	3,164.0	United Kingdom
201,733.6	203,211.2	204,875.3	206,941.2	ECE Central
349.0	328.0	307.0	307.0	Armenia
990.0	990.0	990.0	990.0	Azerbaijan
2,832.7	2,798.4	2,829.3	2,829.3	Georgia
186.0	188.0	187.0	225.0	Israel
18,130.0	18,959.0	19,788.0	19,788.0	Kazakhstan
1,161.3	1,182.1	1,343.9	1,343.9	Kyrgyzstan
552.0	552.0	552.0	554.0	Tajikistan
20,862.0	21,248.5	21,537.1	21,862.5	Turkey
4,127.0	4,127.0	4,127.0	4,127.0	Turkmenistan
4,806.7	4,199.0	4,149.5	4,149.5	Uzbekistan
53,996.7	54,572.0	55,810.8	56,176.2	ECE South-East
388,668.0	388,442.0	388,168.0	387,935.0	Canada
319,113.0	320,209.0	324,682.0	331,374.0	United States of America
707,781.0	708,651.0	712,850.0	719,309.0	ECE West
1,863,556.6	1,867,373.1	1,883,657.2	1,891,621.8	ECE Total
177,721.9	179,134.7	180,310.7	181,917.2	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 2b
Forest area

Country	Annual afforestation (1,000 ha)			Annual natural expansion (1,000 ha)			Annual natural regeneration (1,000 ha)		
	2000	2005	2010	2000	2005	2010	2000	2005	2010
Belarus	14.0	19.0	4.1	n.a.	n.a.	n.a.	n.a.	13.2	12.2
Moldova	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Russian Federation	23.5	11.9	6.6	43.3	58.3	1,262.5	236.2	188.3	170.8
Ukraine	5.0	12.5	24.2	n.a.	n.a.	n.a.	8.0	12.8	15.8
ECE East	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Albania	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Andorra	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Austria	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Belgium	n.a.	0.4	1.2	n.a.	0.2	0.5	n.a.	0.4	0.3
Bosnia and Herzegovina	n.a.	n.a.	2.9	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Bulgaria	2.7	6.0	0.3	12.1	37.3	6.0	2,442.0	2,777.0	2,920.0
Croatia	20.7	16.5	5.9	n.a.	0.4	0.2	6.5	4.8	5.2
Cyprus	0.3	0.1	0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Czech Republic	0.8	0.8	0.4	n.a.	n.a.	n.a.	3.3	4.1	4.8
Denmark	3.0	0	1.0	0	0	0	0	1.0	0
Estonia	1.4	1.0	0.5	1.2	1.5	1.0	20.0	12.4	15.8
Finland	7.0	3.0	3.0	3.0	2.0	2.0	61.0	34.0	30.0
France	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Germany	5.0	9.0	9.0	2.0	2.0	2.0	20.4	41.1	41.1
Greece	0	0	0	0	0	0	0	0	0
Hungary	9.8	7.7	5.1	n.a.	n.a.	n.a.	3.4	3.3	0.1
Iceland	1.4	1.5	1.2	0.1	0.1	0.1	0.1	0.1	0.1
Ireland	14.5	8.9	6.9	0.3	0.3	0.3	n.a.	n.a.	n.a.
Italy	12.5	7.6	1.7	65.4	55.9	52.1	3.0	3.0	3.0
Latvia	0.3	1.7	2.3	6.6	6.6	0.5	10.0	22.2	23.8
Liechtenstein	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Lithuania	0.6	2.4	3.5	6.3	5.4	6.5	n.a.	9.8	7.1
Luxembourg	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Malta	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Monaco	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Montenegro	0	0.2	0.2	0	n.a.	n.a.	0	n.a.	n.a.
Netherlands	1.0	1.0	1.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Norway	0.7	0.2	0.2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Poland	20.7	16.5	5.9	n.a.	0.4	0.2	6.5	4.8	5.2
Portugal	n.a.	29.7	20.5	n.a.	7.4	5.1	n.a.	n.a.	n.a.
Romania	1.3	4.0	1.0	n.a.	n.a.	0	9.9	11.5	13.1
San Marino	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Serbia	1.7	1.1	2.1	0.1	0	0.2	n.a.	n.a.	n.a.
Slovakia	0	0	0	1.2	0.8	1.3	2.1	4.4	5.7
Slovenia	0	0	0	5.1	1.9	1.4	1.4	1.3	1.3
Spain	110.1	37.0	20.8	167.6	52.2	99.4	n.a.	n.a.	n.a.
Sweden	n.a.	n.a.	0	n.a.	n.a.	25.0	75.0	49.0	34.0
Switzerland	0.1	0	0	6.3	7.2	8.1	7.3	7.8	8.2
The former Yugoslav Republic of Macedonia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
United Kingdom	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE Central	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Armenia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Azerbaijan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Georgia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Israel	n.a.	0.2	0.7	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kazakhstan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kyrgyzstan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Tajikistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Turkey	20.5	53.7	95.6	0	2.6	61.3	30.3	26.7	31.5
Turkmenistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Uzbekistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE South-East	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Canada	5.0	2.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
United States of America	182.0	129.0	85.0	122.0	198.0	28.0	3,375.0	3,660.0	2,529.0
ECE West	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE Total	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
EU-28	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Data sources: FAO/FRA (2000, 2005, 2010), Joint FOREST EUROPE/UNECE/FAO pan-European reporting (2011, 2014), national contacts and sources, secretariat's estimates - for more detailed information about sources of data and methods of estimation see web-based version.

Annual planting and seeding (1,000 ha)			Annual coppice (1,000 ha)			Country
2000	2005	2010	2000	2005	2010	
20.6	26.9	30.3	n.a.	n.a.	n.a.	Belarus
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Moldova
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Russian Federation
32.3	37.1	39.2	n.a.	n.a.	n.a.	Ukraine
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	ECE East
0.3	0.3	0.3	n.a.	n.a.	n.a.	Albania
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Andorra
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Austria
n.a.	2.4	1.9	n.a.	n.a.	n.a.	Belgium
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Bosnia and Herzegovina
933.0	874.0	817.0	34.0	53.0	59.0	Bulgaria
42.3	42.1	43.2	0	0	0	Croatia
0.1	0.2	0.2	0	0	0	Cyprus
21.3	18.4	20.9	n.a.	n.a.	n.a.	Czech Republic
4.0	3.0	3.0	n.a.	0	0	Denmark
6.0	6.8	8.0	0	0	0	Estonia
112.0	134.0	112.0	0	0	0	Finland
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	France
4.4	6.4	6.4	0.2	0.5	0.5	Germany
0	0	0	0	0	0	Greece
10.4	10.1	6.8	6.5	6.2	6.5	Hungary
1.4	1.5	1.2	0	0	0	Iceland
8.8	8.7	6.6	n.a.	n.a.	n.a.	Ireland
3.3	3.0	2.7	n.a.	n.a.	n.a.	Italy
8.3	11.3	11.8	0	0	0	Latvia
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Liechtenstein
n.a.	8.2	8.7	n.a.	n.a.	n.a.	Lithuania
n.a.	n.a.	n.a.	n.a.	0	0	Luxembourg
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Malta
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Monaco
0	0.5	0.3	0	n.a.	n.a.	Montenegro
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Netherlands
17.8	11.4	13.2	0	0	0	Norway
42.3	42.1	43.2	0	0	0	Poland
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Portugal
13.0	13.9	11.0	n.a.	n.a.	n.a.	Romania
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	San Marino
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Serbia
11.8	9.1	10.4	0.7	0.6	0.6	Slovakia
0.7	0.5	0.4	n.a.	n.a.	4.1	Slovenia
8.2	19.4	8.9	n.a.	n.a.	n.a.	Spain
123.0	137.0	138.0	0	0	0	Sweden
1.4	1.0	0.6	0	0.1	0.1	Switzerland
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	The former Yugoslav Republic of Macedonia
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	United Kingdom
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	ECE Central
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Armenia
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Azerbaijan
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Georgia
n.a.	0.2	0.7	n.a.	0.3	0.4	Israel
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Kazakhstan
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Kyrgyzstan
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Tajikistan
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Turkey
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Turkmenistan
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Uzbekistan
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	ECE South-East
482.0	480.0	401.0	0	0	0	Canada
778.0	672.0	481.0	n.a.	n.a.	n.a.	United States of America
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	ECE West
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	ECE Total
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 3
Growing stock

Country	Commercial/available for wood supply				Total growing stock			
	Forest (million m ³)				Forest (million m ³)			
	2000	2005	2010	2015	2000	2005	2010	2015
Belarus	1,093	1,174	1,300	1,353	1,339	1,435	1,598	1,669
Moldova	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Russian Federation	69,807	68,756	68,234	67,670	80,270	80,479	81,523	81,488
Ukraine	1,207	1,198	1,390	1,438	1,884	2,004	2,100	2,196
ECE East	72,107	71,129	70,924	70,461	83,494	83,918	85,220	85,353
Albania	59	57	50	50	75	59	52	52
Andorra	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Austria	1,038	1,072	1,096	1,121	1,067	1,102	1,129	1,155
Belgium	157	160	166	170	157	169	179	188
Bosnia and Herzegovina	358	358	389	392	358	358	389	392
Bulgaria	526	591	645	699	526	591	645	699
Croatia	333	352	371	389	360	385	406	415
Cyprus	3	3	3	4	8	8	10	11
Czech Republic	678	704	668	671	699	735	755	791
Denmark	91	100	105	111	94	110	113	120
Estonia	428	414	415	426	458	455	470	476
Finland	1,927	2,005	2,099	2,099	2,085	2,181	2,320	2,320
France	2,119	2,377	2,517	2,697	2,254	2,512	2,649	2,860
Germany	3,226	3,341	3,451	3,493	3,381	3,502	3,617	3,663
Greece	n.a.	n.a.	n.a.	n.a.	170	177	185	185
Hungary	291	303	315	331	325	341	359	377
Iceland	0	0	0	0	0	0	0	1
Ireland	n.a.	61	80	104	n.a.	69	90	117
Italy	1,155	1,269	1,384	1,384	1,068	1,174	1,279	1,385
Latvia	496	516	567	616	537	557	614	665
Liechtenstein	n.a.	n.a.	n.a.	0	2	2	2	2
Lithuania	392	398	408	418	450	465	490	515
Luxembourg	26	26	26	26	26	26	26	26
Malta	n.a.	n.a.	n.a.	n.a.	0	0	0	0
Monaco	0	0	0	0	0	0	0	0
Montenegro	68	68	105	105	73	73	121	121
Netherlands	49	57	61	65	61	71	76	81
Norway	821	893	963	1,033	898	981	1,069	1,157
Poland	1,584	1,724	2,028	2,190	1,736	1,909	2,372	2,540
Portugal	198	185	186	n.a.	163	152	154	n.a.
Romania	1,064	1,068	1,089	1,293	1,346	1,352	1,378	1,930
San Marino	0	0	0	0	0	0	0	0
Serbia	211	251	350	353	250	298	415	418
Slovakia	437	455	429	440	463	495	514	532
Slovenia	312	351	390	394	333	374	406	432
Spain	n.a.	800	872	944	906	1,027	1,120	1,212
Sweden	n.a.	2,397	2,414	2,390	2,703	2,907	2,948	2,989
Switzerland	403	408	417	426	417	422	432	442
The former Yugoslav Republic of Macedonia	79	76	76	76	79	76	76	76
United Kingdom	480	537	595	652	480	537	595	652
ECE Central	19,006	23,379	24,731	25,561	24,008	25,653	27,455	28,997
Armenia	n.a.	n.a.	n.a.	n.a.	38	36	33	33
Azerbaijan	n.a.	n.a.	n.a.	n.a.	127	127	127	127
Georgia	91	93	94	94	445	456	455	455
Israel	0	0	0	0	6	6	6	6
Kazakhstan	0	0	0	0	363	364	364	364
Kyrgyzstan	0	0	0	0	27	30	45	45
Tajikistan	0	0	0	0	5	5	5	5
Turkey	775	828	923	1,032	1,132	1,209	1,347	1,507
Turkmenistan	0	0	0	0	14	15	15	15
Uzbekistan	0	0	0	0	19	24	26	26
ECE South-East	866	921	1,017	1,126	2,177	2,270	2,421	2,581
Canada	n.a.	n.a.	n.a.	n.a.	n.a.	47,320	n.a.	n.a.
United States of America	37,546	40,319	43,092	43,092	30,969	35,201	37,847	40,699
ECE West	37,546	40,319	43,092	43,092	30,969	82,521	37,847	40,699
ECE Total	129,526	135,747	139,764	140,240	140,648	194,362	152,944	157,631
EU-28	17,008	21,267	22,380	23,125	21,857	23,384	24,898	26,336

Data sources: FAO/FRA (2000, 2005, 2010), Joint FOREST EUROPE/UNECE/FAO pan-European reporting (2011, 2014), national contacts and sources, secretariat's estimates - for more detailed information about sources of data and methods of estimation see web-based version.

Total growing stock								Country
Other wooded land (million m ³)				Forest and other wooded land (million m ³)				
2000	2005	2010	2015	2000	2005	2010	2015	
41	23	16	11	9,191	8,935	9,171	9,229	Belarus
n.a.	n.a.	n.a.	n.a.	429	429	429	429	Moldova
1,593	1,651	1,775	1,534	880,875	881,959	890,948	889,855	Russian Federation
n.a.	n.a.	1	1	9,551	9,616	9,574	9,683	Ukraine
1,635	1,674	1,793	1,547	900,045	900,939	910,121	909,195	ECE East
7	14	22	22	1,031	1,043	1,043	1,237	Albania
n.a.	n.a.	n.a.	n.a.	16	16	16	16	Andorra
0	0	0	0	3,955	3,978	4,000	4,022	Austria
n.a.	n.a.	n.a.	n.a.	694	704	714	719	Belgium
n.a.	n.a.	n.a.	n.a.	2,734	2,734	2,778	2,799	Bosnia and Herzegovina
n.a.	n.a.	n.a.	n.a.	3,480	3,677	3,761	3,845	Bulgaria
4	5	6	6	2,300	2,387	2,474	2,491	Croatia
n.a.	n.a.	n.a.	n.a.	385	387	386	386	Cyprus
0	0	0	0	2,637	2,647	2,657	2,667	Czech Republic
4	1	1	1	721	600	634	657	Denmark
7	7	7	7	2,451	2,465	2,453	2,456	Estonia
5	11	8	8	23,283	23,300	23,019	23,019	Finland
n.a.	n.a.	n.a.	n.a.	17,093	16,748	17,163	17,579	France
0	0	0	0	11,354	11,384	11,409	11,419	Germany
n.a.	n.a.	n.a.	n.a.	6,525	6,532	6,539	6,539	Greece
n.a.	n.a.	n.a.	n.a.	1,907	1,983	2,046	2,190	Hungary
0	0	0	0	159	171	182	193	Iceland
n.a.	n.a.	n.a.	n.a.	684	745	773	801	Ireland
n.a.	n.a.	n.a.	n.a.	10,019	10,467	10,789	11,110	Italy
2	2	2	2	3,364	3,415	3,467	3,468	Latvia
n.a.	n.a.	n.a.	n.a.	7	7	7	7	Liechtenstein
3	2	2	2	2,103	2,194	2,254	2,284	Lithuania
n.a.	n.a.	n.a.	n.a.	88	88	88	88	Luxembourg
0	0	0	0	0	0	0	0	Malta
0	0	0	0	0	0	0	0	Monaco
2	2	0	0	744	744	964	964	Montenegro
0	0	0	0	360	365	373	376	Netherlands
6	6	7	8	13,982	13,962	14,043	14,124	Norway
0	0	0	0	9,059	9,200	9,329	9,435	Poland
n.a.	n.a.	n.a.	n.a.	4,561	4,577	4,742	4,907	Portugal
5	5	5	5	6,600	6,743	404	6,951	Romania
0	0	0	0	0	0	0	0	San Marino
3	3	26	37	2,981	2,997	3,123	3,228	Serbia
n.a.	n.a.	n.a.	n.a.	1,921	1,932	1,939	1,940	Slovakia
2	2	1	1	1,271	1,272	1,272	1,271	Slovenia
2	2	2	2	27,337	27,541	27,525	27,627	Spain
7	7	5	7	30,595	30,762	30,505	30,505	Sweden
1	1	1	1	1,257	1,284	1,304	1,324	Switzerland
n.a.	n.a.	n.a.	n.a.	1,101	1,118	1,103	1,131	The former Yugoslav Republic of Macedonia
n.a.	n.a.	n.a.	n.a.	2,974	3,041	3,079	3,164	United Kingdom
59	69	95	109	201,734	203,211	198,360	206,941	ECE Central
1	1	1	1	349	328	307	307	Armenia
n.a.	n.a.	n.a.	n.a.	990	990	990	990	Azerbaijan
n.a.	n.a.	n.a.	n.a.	2,833	2,798	2,829	2,829	Georgia
n.a.	n.a.	n.a.	n.a.	186	188	187	225	Israel
12	12	12	12	18,130	18,959	19,788	19,788	Kazakhstan
n.a.	n.a.	n.a.	n.a.	1,161	1,182	1,344	1,344	Kyrgyzstan
1	1	1	1	552	552	552	554	Tajikistan
82	87	81	73	20,862	21,249	21,537	21,862	Turkey
n.a.	n.a.	n.a.	n.a.	4,127	4,127	4,127	4,127	Turkmenistan
n.a.	n.a.	n.a.	n.a.	4,807	4,199	4,150	4,150	Uzbekistan
95	101	94	86	53,997	54,572	55,811	56,176	ECE South-East
n.a.	n.a.	n.a.	n.a.	388,668	388,442	388,168	387,935	Canada
174	336	345	414	319,113	320,209	324,682	331,374	United States of America
174	336	345	414	707,781	708,651	712,850	719,309	ECE West
1,963	2,179	2,327	2,156	1,863,557	1,867,373	1,877,142	1,891,622	ECE Total
40	43	39	42	177,722	179,135	173,796	181,917	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 4a
Carbon stock

Country	Forest							
	Carbon in living biomass: Above-ground (Million metric tonnes)				Carbon in living biomass: Below-ground (Million metric tonnes)			
	2000	2005	2010	2015	2000	2005	2010	2015
Belarus	370	415	468	468	112	126	142	142
Moldova	21	22	23	23	5	5	5	5
Russian Federation	25,736	25,787	26,000	26,000	6,421	6,423	6,500	6,500
Ukraine	533	573	620	640	129	139	138	143
ECE East	26,660	26,797	27,112	27,132	6,667	6,693	6,786	6,791
Albania	37	37	37	37	12	12	12	12
Andorra	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Austria	292	301	306	312	76	77	78	79
Belgium	49	54	57	60	10	11	12	12
Bosnia and Herzegovina	95	95	95	95	23	23	23	23
Bulgaria	126	142	155	167	35	40	43	46
Croatia	170	182	192	196	52	55	59	60
Cyprus	2	2	3	3	1	1	1	1
Czech Republic	273	287	294	309	50	53	54	57
Denmark	32	31	32	34	5	6	6	7
Estonia	134	133	131	131	35	35	34	34
Finland	546	569	597	597	169	176	184	184
France	816	907	968	1,056	233	258	279	308
Germany	901	938	969	1,027	142	147	152	162
Greece	57	59	62	0	16	17	17	17
Hungary	86	88	94	98	21	22	23	24
Iceland	0	0	0	1	0	0	0	0
Ireland	27	31	40	40	6	7	9	n.a.
Italy	398	437	476	514	98	108	117	127
Latvia	175	181	200	216	56	58	64	69
Liechtenstein	0	0	0	0	0	0	0	0
Lithuania	119	123	129	136	27	28	30	31
Luxembourg	8	8	8	8	1	1	1	1
Malta	0	0	0	0	0	0	0	0
Monaco	0	0	0	0	0	0	0	0
Montenegro	29	29	48	48	5	5	8	8
Netherlands	20	21	24	27	4	4	5	5
Norway	293	319	346	372	84	90	97	104
Poland	455	500	639	685	91	100	128	137
Portugal	72	72	73	n.a.	30	30	30	n.a.
Romania	487	489	498	622	112	112	114	185
San Marino	0	0	0	0	0	0	0	0
Serbia	107	114	183	185	31	33	52	52
Slovakia	156	166	174	181	34	36	38	39
Slovenia	87	99	108	115	20	23	25	26
Spain	341	389	424	458	113	129	140	151
Sweden	763	818	827	836	254	273	276	279
Switzerland	112	114	118	120	30	31	32	32
The former Yugoslav Republic of Macedonia	49	48	48	48	13	13	13	13
United Kingdom	129	144	159	174	46	52	57	63
ECE Central	7,444	7,927	8,512	8,905	1,933	2,063	2,210	2,348
Armenia	12	11	10	10	3	3	2	2
Azerbaijan	46	46	46	46	8	8	8	8
Georgia	161	165	168	168	42	43	44	44
Israel	3	4	4	4	1	1	1	1
Kazakhstan	105	105	105	105	31	31	31	31
Kyrgyzstan	24	26	39	39	10	11	17	17
Tajikistan	2	2	2	2	1	1	1	1
Turkey	477	509	568	639	127	136	152	170
Turkmenistan	8	8	8	8	3	4	4	4
Uzbekistan	10	12	13	13	4	5	6	6
ECE South-East	848	888	965	1,035	231	243	265	10
Canada	11,560	11,337	11,218	11,218	2,848	2,799	2,774	n.a.
United States of America	13,114	13,684	14,247	14,466	2,597	2,709	2,820	2,864
ECE West	24,674	25,021	25,465	25,684	5,508	5,594	2,864	2,864
ECE Total	59,626	60,632	62,053	62,756	14,338	14,592	12,125	9,139
EU-28	6,721	7,171	7,636	7,999	1,735	1,858	1,974	2,105

Data sources: FAO/FRA (2000, 2005, 2010), Joint FOREST EUROPE/UNECE/FAO pan-European reporting (2011, 2014), national contacts and sources, secretariat's estimates - for more detailed information about sources of data and methods of estimation see web-based version.

Forest					Country
Carbon in dead wood (Million metric tonnes)					
2000	2005	2010	2015		
3	3	3	3	Belarus	
n.a.	n.a.	n.a.	n.a.	Moldova	
7,228	7,198	7,400	7,300	Russian Federation	
5	5	27	27	Ukraine	
n.a.	n.a.	n.a.	n.a.	ECE East	
n.a.	n.a.	n.a.	n.a.	Albania	
n.a.	n.a.	n.a.	n.a.	Andorra	
4	5	6	7	Austria	
1	1	2	2	Belgium	
n.a.	n.a.	n.a.	n.a.	Bosnia and Herzegovina	
n.a.	n.a.	n.a.	n.a.	Bulgaria	
n.a.	n.a.	n.a.	n.a.	Croatia	
n.a.	n.a.	n.a.	n.a.	Cyprus	
17	17	17	17	Czech Republic	
1	1	1	1	Denmark	
8	10	12	12	Estonia	
15	17	17	17	Finland	
n.a.	n.a.	n.a.	n.a.	France	
25	30	32	29	Germany	
n.a.	n.a.	n.a.	n.a.	Greece	
n.a.	n.a.	4	5	Hungary	
n.a.	n.a.	n.a.	n.a.	Iceland	
1	1	2	n.a.	Ireland	
23	25	27	29	Italy	
5	16	17	23	Latvia	
n.a.	n.a.	n.a.	n.a.	Liechtenstein	
10	11	11	11	Lithuania	
n.a.	n.a.	n.a.	n.a.	Luxembourg	
n.a.	n.a.	n.a.	n.a.	Malta	
0	0	0	0	Monaco	
3	3	4	4	Montenegro	
1	1	2	2	Netherlands	
n.a.	n.a.	n.a.	n.a.	Norway	
n.a.	n.a.	32	32	Poland	
n.a.	n.a.	n.a.	n.a.	Portugal	
n.a.	n.a.	n.a.	2	Romania	
0	0	0	0	San Marino	
19	21	33	33	Serbia	
15	15	15	17	Slovakia	
9	10	6	6	Slovenia	
n.a.	n.a.	n.a.	n.a.	Spain	
21	27	29	30	Sweden	
7	7	8	8	Switzerland	
0	0	0	0	The former Yugoslav Republic of Macedonia	
3	3	3	3	United Kingdom	
n.a.	n.a.	n.a.	n.a.	ECE Central	
n.a.	n.a.	n.a.	n.a.	Armenia	
n.a.	n.a.	n.a.	n.a.	Azerbaijan	
n.a.	n.a.	n.a.	n.a.	Georgia	
0	0	0	0	Israel	
n.a.	n.a.	n.a.	n.a.	Kazakhstan	
n.a.	n.a.	n.a.	n.a.	Kyrgyzstan	
0	0	0	0	Tajikistan	
5	5	6	6	Turkey	
n.a.	n.a.	n.a.	n.a.	Turkmenistan	
n.a.	n.a.	n.a.	n.a.	Uzbekistan	
n.a.	n.a.	n.a.	n.a.	ECE South-East	
4,823	4,900	4,923	n.a.	Canada	
2,244	2,313	2,382	2,412	United States of America	
n.a.	n.a.	n.a.	n.a.	ECE West	
n.a.	n.a.	n.a.	n.a.	ECE Total	
n.a.	n.a.	n.a.	n.a.	EU-28	

ANNEX 3: SOURCE DATA TABLES

Table 4b

Carbon stock

Country	Forest			
	Carbon in litter (Million metric tonnes)			
	2000	2005	2010	2015
Belarus	237	241	247	247
Moldova	n.a.	n.a.	n.a.	n.a.
Russian Federation	9,500	9,500	9,600	9,600
Ukraine	50	51	51	51
ECE East	n.a.	n.a.	n.a.	n.a.
Albania	12	12	12	12
Andorra	n.a.	n.a.	n.a.	n.a.
Austria	n.a.	n.a.	0	n.a.
Belgium	6	6	6	6
Bosnia and Herzegovina	n.a.	n.a.	n.a.	n.a.
Bulgaria	6	7	8	8
Croatia	n.a.	n.a.	n.a.	n.a.
Cyprus	n.a.	n.a.	n.a.	n.a.
Czech Republic	15	16	16	17
Denmark	7	6	7	8
Estonia	n.a.	n.a.	n.a.	n.a.
Finland	243	247	251	251
France	133	137	138	n.a.
Germany	202	200	198	197
Greece	n.a.	n.a.	n.a.	n.a.
Hungary	n.a.	n.a.	n.a.	n.a.
Iceland	0	0	0	0
Ireland	2	2	6	n.a.
Italy	27	28	29	30
Latvia	63	64	70	71
Liechtenstein	n.a.	n.a.	n.a.	n.a.
Lithuania	49	51	52	52
Luxembourg	2	2	2	2
Malta	n.a.	n.a.	n.a.	n.a.
Monaco	0	0	0	0
Montenegro	n.a.	n.a.	n.a.	n.a.
Netherlands	9	9	9	9
Norway	n.a.	n.a.	n.a.	n.a.
Poland	n.a.	n.a.	n.a.	n.a.
Portugal	n.a.	n.a.	n.a.	n.a.
Romania	144	144	147	155
San Marino	0	0	0	0
Serbia	39	40	43	44
Slovakia	20	20	22	22
Slovenia	7	7	7	13
Spain	n.a.	n.a.	n.a.	n.a.
Sweden	645	640	633	630
Switzerland	20	20	21	21
The former Yugoslav Republic of Macedonia	n.a.	n.a.	n.a.	n.a.
United Kingdom	48	49	50	51
ECE Central	n.a.	n.a.	n.a.	n.a.
Armenia	9	8	7	7
Azerbaijan	n.a.	n.a.	n.a.	n.a.
Georgia	54	54	54	54
Israel	0	0	0	0
Kazakhstan	n.a.	n.a.	n.a.	n.a.
Kyrgyzstan	21	21	23	23
Tajikistan	n.a.	n.a.	n.a.	n.a.
Turkey	193	202	212	222
Turkmenistan	n.a.	n.a.	n.a.	n.a.
Uzbekistan	n.a.	n.a.	n.a.	n.a.
ECE South-East	n.a.	n.a.	n.a.	n.a.
Canada	11,583	11,666	116,393	n.a.
United States of America	4,415	4,437	4,507	4,535
ECE West	n.a.	n.a.	n.a.	n.a.
ECE Total	n.a.	n.a.	n.a.	n.a.
EU-28	n.a.	n.a.	n.a.	n.a.

Data sources: FAO/FRA (2000, 2005, 2010), Joint FOREST EUROPE/UNECE/FAO pan-European reporting (2011, 2014), national contacts and sources, secretariat's estimates - for more detailed information about sources of data and methods of estimation see web-based version.

Forest Soil carbon (Million metric tonnes)				Country
2000	2005	2010	2015	
490	500	511	511	Belarus
n.a.	n.a.	n.a.	n.a.	Moldova
78,000	78,000	78,000	78,000	Russian Federation
238	239	239	239	Ukraine
n.a.	n.a.	n.a.	n.a.	ECE East
67	69	68	68	Albania
n.a.	n.a.	n.a.	n.a.	Andorra
n.a.	n.a.	585	n.a.	Austria
57	59	62	64	Belgium
n.a.	n.a.	n.a.	n.a.	Bosnia and Herzegovina
321	347	355	363	Bulgaria
n.a.	n.a.	n.a.	n.a.	Croatia
4	4	4	4	Cyprus
169	169	170	171	Czech Republic
99	103	106	103	Denmark
350	351	346	346	Estonia
4,069	4,061	4,056	4,056	Finland
1,079	1,105	1,120	n.a.	France
705	725	745	765	Germany
n.a.	n.a.	n.a.	0	Greece
n.a.	n.a.	n.a.	n.a.	Hungary
2	3	4	4	Iceland
281	304	320	n.a.	Ireland
684	716	738	760	Italy
241	245	248	249	Latvia
n.a.	n.a.	n.a.	n.a.	Liechtenstein
145	153	156	157	Lithuania
7	7	7	7	Luxembourg
n.a.	n.a.	n.a.	n.a.	Malta
0	0	0	0	Monaco
n.a.	n.a.	n.a.	n.a.	Montenegro
39	40	41	41	Netherlands
n.a.	n.a.	n.a.	n.a.	Norway
n.a.	n.a.	822	n.a.	Poland
n.a.	n.a.	n.a.	n.a.	Portugal
578	580	591	608	Romania
0	0	0	0	San Marino
234	235	258	258	Serbia
271	271	271	271	Slovakia
122	122	123	129	Slovenia
n.a.	n.a.	570	575	Spain
1,839	1,874	1,877	1,901	Sweden
95	97	99	100	Switzerland
n.a.	n.a.	n.a.	n.a.	The former Yugoslav Republic of Macedonia
691	708	717	740	United Kingdom
n.a.	n.a.	n.a.	n.a.	ECE Central
11	11	10	10	Armenia
n.a.	n.a.	n.a.	n.a.	Azerbaijan
191	191	191	191	Georgia
4	4	4	4	Israel
n.a.	n.a.	n.a.	n.a.	Kazakhstan
33	33	36	36	Kyrgyzstan
32	28	32	32	Tajikistan
346	363	381	398	Turkey
79	79	79	79	Turkmenistan
n.a.	n.a.	n.a.	n.a.	Uzbekistan
n.a.	n.a.	n.a.	n.a.	ECE South-East
19,719	19,738	19,753	n.a.	Canada
16,423	16,636	16,862	16,950	United States of America
n.a.	n.a.	n.a.	n.a.	ECE West
n.a.	n.a.	n.a.	n.a.	ECE Total
n.a.	n.a.	n.a.	n.a.	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 4c
Carbon stock

Country	Other wooded land							
	Carbon in living biomass: Above-ground (Million metric tonnes)				Carbon in living biomass: Below-ground (Million metric tonnes)			
	2000	2005	2010	2015	2000	2005	2010	2015
Belarus	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Moldova	1.5	2.2	2.4	2.4	0.5	1.3	1.9	1.9
Russian Federation	200	225	250	200	100	110	120	100
Ukraine	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE East	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Albania	4.4	3	3.9	3.9	12.3	8.7	11	11
Andorra	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Austria	1.5	2.0	2.0	2.0	0.5	0.5	0.5	0.5
Belgium	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Bosnia and Herzegovina	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Bulgaria	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Croatia	10	11.7	13.4	13.80	5.3	6.1	7	7.2
Cyprus	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Czech Republic	0	0	0	0	0	0	0	0
Denmark	0.9	0.3	0.3	0.3	0.1	0.1	0.1	0.1
Estonia	1.5	1.7	1.8	1.8	0.4	0.4	0.4	0.4
Finland	1.6	2.1	1.9	1.9	0.6	0.8	0.7	0.7
France	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Germany	0	0	0	0	0	0	0	0
Greece	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Hungary	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Iceland	1	1	1	2	0.2	0.2	0.3	0.3
Ireland	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Italy	33	34	35	36.00	8	8	8	9
Latvia	0.7	0.7	0.6	0.6	0.2	0.2	0.2	0.2
Liechtenstein	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Lithuania	0.7	0.6	0.7	0.80	0.2	0.2	0.2	0.2
Luxembourg	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Malta	0	0	0	0	0	0	0	0
Monaco	0	0	0	0	0	0	0	0
Montenegro	0.5	0.5	0.2	0.20	0.1	0.1	0	0
Netherlands	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Norway	1.9	2.1	2.3	2.6	0.7	0.8	0.8	0.9
Poland	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Portugal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Romania	n.a.	n.a.	n.a.	1.70	n.a.	n.a.	n.a.	0.4
San Marino	0	0	0	0	0	0	0	0
Serbia	0.9	0.9	7.1	9.5	0.2	0.2	0.9	1.2
Slovakia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Slovenia	0.7	0.5	0.5	0.40	0.2	0.2	0.2	0.2
Spain	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sweden	2.7	2.8	2.2	2.80	0.9	0.9	0.7	0.9
Switzerland	0.2	0.2	0.2	0.20	0.1	0.1	0.1	0.1
The former Yugoslav Republic of Macedonia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
United Kingdom	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE Central	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Armenia	1.1	1.1	1.1	1.1	0.5	0.5	0.5	0.5
Azerbaijan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Georgia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Israel	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kazakhstan	3.5	3.5	3.5	3.5	1.3	1.2	1.2	1.2
Kyrgyzstan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Tajikistan	0.3	0.3	0.3	0.3	0.1	0.1	0.1	0.1
Turkey	122	130	121	108	52	55	51	45
Turkmenistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Uzbekistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE South-East	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Canada	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
United States of America	227	228	229	330.00	42	43	43	43
ECE West	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE Total	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
EU-28	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Data sources: FAO/FRA (2000, 2005, 2010), Joint FOREST EUROPE/UNECE/FAO pan-European reporting (2011, 2014), national contacts and sources, secretariat's estimates - for more detailed information about sources of data and methods of estimation see web-based version.

Other wooded land				Country
Carbon in dead wood (Million metric tonnes)				
2000	2005	2010	2015	
n.a.	n.a.	n.a.	n.a.	Belarus
n.a.	n.a.	n.a.	n.a.	Moldova
100	115	125	110	Russian Federation
n.a.	n.a.	n.a.	n.a.	Ukraine
n.a.	n.a.	n.a.	n.a.	ECE East
n.a.	n.a.	n.a.	n.a.	Albania
n.a.	n.a.	n.a.	n.a.	Andorra
n.a.	n.a.	n.a.	n.a.	Austria
n.a.	n.a.	n.a.	n.a.	Belgium
n.a.	n.a.	n.a.	n.a.	Bosnia and Herzegovina
n.a.	n.a.	n.a.	n.a.	Bulgaria
n.a.	n.a.	n.a.	n.a.	Croatia
n.a.	n.a.	n.a.	n.a.	Cyprus
0	0	0	0	Czech Republic
0.1	0	0	0	Denmark
0	0.1	0.1	0.1	Estonia
0.4	0.4	0.4	0.4	Finland
n.a.	n.a.	n.a.	n.a.	France
0	0	0	0	Germany
n.a.	n.a.	n.a.	n.a.	Greece
n.a.	n.a.	n.a.	n.a.	Hungary
n.a.	n.a.	n.a.	n.a.	Iceland
n.a.	n.a.	n.a.	n.a.	Ireland
n.a.	n.a.	n.a.	n.a.	Italy
0	0	0	0	Latvia
n.a.	n.a.	n.a.	n.a.	Liechtenstein
0.1	0.1	0.1	0.1	Lithuania
n.a.	n.a.	n.a.	n.a.	Luxembourg
0	0	0	0	Malta
0	0	0	0	Monaco
0.1	0.1	0	0	Montenegro
n.a.	n.a.	n.a.	n.a.	Netherlands
n.a.	n.a.	n.a.	n.a.	Norway
n.a.	n.a.	n.a.	n.a.	Poland
n.a.	n.a.	n.a.	n.a.	Portugal
n.a.	n.a.	n.a.	0	Romania
0	0	0	0	San Marino
0.1	0.1	0	0.9	Serbia
n.a.	n.a.	n.a.	n.a.	Slovakia
0	0	0	0	Slovenia
n.a.	n.a.	n.a.	n.a.	Spain
0.4	0.4	0.3	0.3	Sweden
0.1	0	0	0	Switzerland
n.a.	n.a.	n.a.	n.a.	The former Yugoslav Republic of Macedonia
n.a.	n.a.	n.a.	n.a.	United Kingdom
n.a.	n.a.	n.a.	n.a.	ECE Central
n.a.	n.a.	n.a.	n.a.	Armenia
n.a.	n.a.	n.a.	n.a.	Azerbaijan
n.a.	n.a.	n.a.	n.a.	Georgia
n.a.	n.a.	n.a.	n.a.	Israel
n.a.	n.a.	n.a.	n.a.	Kazakhstan
n.a.	n.a.	n.a.	n.a.	Kyrgyzstan
n.a.	n.a.	n.a.	n.a.	Tajikistan
1	1	1	1	Turkey
n.a.	n.a.	n.a.	n.a.	Turkmenistan
n.a.	n.a.	n.a.	n.a.	Uzbekistan
n.a.	n.a.	n.a.	n.a.	ECE South-East
n.a.	n.a.	n.a.	n.a.	Canada
29	29	29	29.00	United States of America
n.a.	n.a.	n.a.	n.a.	ECE West
n.a.	n.a.	n.a.	n.a.	ECE Total
n.a.	n.a.	n.a.	n.a.	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 4d

Carbon stock

Country	Other wooded land			
	Carbon in litter (Million metric tonnes)			
	2000	2005	2010	2015
Belarus	n.a.	n.a.	n.a.	n.a.
Moldova	n.a.	n.a.	n.a.	n.a.
Russian Federation	100	110	125	110.00
Ukraine	n.a.	n.a.	n.a.	n.a.
ECE East	n.a.	n.a.	n.a.	n.a.
Albania	4.1	4.1	4.1	4.1
Andorra	n.a.	n.a.	n.a.	n.a.
Austria	n.a.	n.a.	n.a.	n.a.
Belgium	n.a.	n.a.	n.a.	n.a.
Bosnia and Herzegovina	n.a.	n.a.	n.a.	n.a.
Bulgaria	n.a.	n.a.	n.a.	n.a.
Croatia	n.a.	n.a.	n.a.	n.a.
Cyprus	n.a.	n.a.	n.a.	n.a.
Czech Republic	0	0	0	0
Denmark	1.7	0.6	0.6	0.6
Estonia	n.a.	n.a.	n.a.	n.a.
Finland	10	10.3	10.8	10.8
France	n.a.	n.a.	n.a.	n.a.
Germany	0	0	0	0.00
Greece	n.a.	n.a.	n.a.	n.a.
Hungary	n.a.	n.a.	n.a.	n.a.
Iceland	1	1	1	1
Ireland	n.a.	n.a.	n.a.	n.a.
Italy	n.a.	n.a.	n.a.	n.a.
Latvia	2.5	2.4	2.4	2.4
Liechtenstein	n.a.	n.a.	n.a.	n.a.
Lithuania	2	1.8	2	2.50
Luxembourg	n.a.	n.a.	n.a.	n.a.
Malta	0	0	0	0
Monaco	0	0	0	0
Montenegro	n.a.	n.a.	n.a.	n.a.
Netherlands	n.a.	n.a.	n.a.	n.a.
Norway	n.a.	n.a.	n.a.	n.a.
Poland	n.a.	n.a.	n.a.	n.a.
Portugal	n.a.	n.a.	n.a.	n.a.
Romania	n.a.	n.a.	n.a.	2.00
San Marino	0	0	0	0
Serbia	8.3	8.3	6.6	8.1
Slovakia	n.a.	n.a.	n.a.	n.a.
Slovenia	0.1	0.1	0.1	0.1
Spain	n.a.	n.a.	n.a.	n.a.
Sweden	55.7	57.7	54.9	54.50
Switzerland	1.1	1.1	1.2	1.20
The former Yugoslav Republic of Macedonia	n.a.	n.a.	n.a.	n.a.
United Kingdom	n.a.	n.a.	n.a.	n.a.
ECE Central	n.a.	n.a.	n.a.	n.a.
Armenia	n.a.	n.a.	n.a.	n.a.
Azerbaijan	n.a.	n.a.	n.a.	n.a.
Georgia	n.a.	n.a.	n.a.	n.a.
Israel	n.a.	n.a.	n.a.	n.a.
Kazakhstan	n.a.	n.a.	n.a.	n.a.
Kyrgyzstan	n.a.	n.a.	n.a.	n.a.
Tajikistan	n.a.	n.a.	n.a.	n.a.
Turkey	44	44	44	43
Turkmenistan	n.a.	n.a.	n.a.	n.a.
Uzbekistan	n.a.	n.a.	n.a.	n.a.
ECE South-East	n.a.	n.a.	n.a.	n.a.
Canada	n.a.	n.a.	n.a.	n.a.
United States of America	441	443	445	447.00
ECE West	n.a.	n.a.	n.a.	n.a.
ECE Total	n.a.	n.a.	n.a.	n.a.
EU-28	n.a.	n.a.	n.a.	n.a.

Data sources: FAO/FRA (2000, 2005, 2010). Joint FOREST EUROPE/UNECE/FAO pan-European reporting (2011, 2014). national contacts and sources. secretariat's estimates - for more detailed information about sources of data and methods of estimation see web-based version.

Other wooded land				Country
Soil carbon (Million metric tonnes)				
2000	2005	2010	2015	
n.a.	n.a.	n.a.	n.a.	Belarus
n.a.	n.a.	n.a.	n.a.	Moldova
2,000	2,000	2,000	2,000	Russian Federation
n.a.	n.a.	n.a.	n.a.	Ukraine
n.a.	n.a.	n.a.	n.a.	ECE East
24.5	22.3	23.2	23.2	Albania
n.a.	n.a.	n.a.	n.a.	Andorra
n.a.	n.a.	n.a.	n.a.	Austria
n.a.	n.a.	n.a.	n.a.	Belgium
n.a.	n.a.	n.a.	n.a.	Bosnia and Herzegovina
10	2.5	2.3	2.1	Bulgaria
n.a.	n.a.	n.a.	n.a.	Croatia
4.8	4.8	4.8	4.8	Cyprus
0	0	0	0	Czech Republic
n.a.	n.a.	n.a.	n.a.	Denmark
14.7	17.2	20.7	20.7	Estonia
481	479.8	478.2	478.2	Finland
n.a.	n.a.	n.a.	n.a.	France
0	0	0	0.00	Germany
n.a.	n.a.	n.a.	n.a.	Greece
n.a.	n.a.	n.a.	n.a.	Hungary
14	15	15	16	Iceland
n.a.	n.a.	n.a.	n.a.	Ireland
116	120	123	127	Italy
7.40	7.10	6.80	6.70	Latvia
n.a.	n.a.	n.a.	n.a.	Liechtenstein
6.4	5.3	6	7.50	Lithuania
n.a.	n.a.	n.a.	n.a.	Luxembourg
0	0	0	0	Malta
0	0	0	0	Monaco
n.a.	n.a.	n.a.	n.a.	Montenegro
n.a.	n.a.	n.a.	n.a.	Netherlands
n.a.	n.a.	n.a.	n.a.	Norway
n.a.	n.a.	n.a.	n.a.	Poland
n.a.	n.a.	n.a.	n.a.	Portugal
n.a.	n.a.	n.a.	n.a.	Romania
0	0	0	0	San Marino
49.5	49.5	39	48.3	Serbia
n.a.	n.a.	n.a.	n.a.	Slovakia
3.9	3	2.6	2.4	Slovenia
n.a.	n.a.	n.a.	n.a.	Spain
158.8	168.9	162.6	164.7	Sweden
5	5.4	5.5	5.6	Switzerland
n.a.	n.a.	n.a.	n.a.	The former Yugoslav Republic of Macedonia
n.a.	n.a.	n.a.	n.a.	United Kingdom
n.a.	n.a.	n.a.	n.a.	ECE Central
n.a.	n.a.	n.a.	n.a.	Armenia
n.a.	n.a.	n.a.	n.a.	Azerbaijan
n.a.	n.a.	n.a.	n.a.	Georgia
n.a.	n.a.	n.a.	n.a.	Israel
n.a.	n.a.	n.a.	n.a.	Kazakhstan
n.a.	n.a.	n.a.	n.a.	Kyrgyzstan
3.5	3	3.5	3.5	Tajikistan
363	360	351	344	Turkey
n.a.	n.a.	n.a.	n.a.	Turkmenistan
n.a.	n.a.	n.a.	n.a.	Uzbekistan
n.a.	n.a.	n.a.	n.a.	ECE South-East
n.a.	n.a.	n.a.	n.a.	Canada
667	670	673	675	United States of America
n.a.	n.a.	n.a.	n.a.	ECE West
n.a.	n.a.	n.a.	n.a.	ECE Total
n.a.	n.a.	n.a.	n.a.	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 5a
LULUCF

Country	Land-use, land-use change and forestry (LULUCF), National total emissions, minus being a sink, plus being a source						
	Forest land (Tg CO ₂ equivalent)				Cropland (Tg CO ₂ equivalent)		
	2000	2005	2010	2012	2000	2005	2010
Belarus	-30.9	-26.7	-30.1	-25.7	-0.1	0.4	-0.1
Moldova	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Russian Federation	-565.2	-580.5	-680.7	-676.3	200.7	165.2	183.0
Ukraine	-60.2	-56.2	-55.4	-63.1	8.1	15.6	14.4
ECE East	-656.3	-663.4	-766.2	-765.2	208.7	181.3	197.4
Albania	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Andorra	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Austria	-16.0	-8.8	-4.6	-4.5	0.1	0.2	0.2
Belgium	-3.1	-3.9	-3.8	-3.8	1.6	1.7	1.9
Bosnia and Herzegovina	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Bulgaria	-10.7	-11.0	-10.6	-10.4	1.9	1.9	1.5
Croatia	-8.2	-8.3	-7.7	-6.7	0.3	0.3	0.2
Cyprus	-0.2	-0.1	-0.1	-0.1	n.a.	n.a.	n.a.
Czech Republic	-7.3	-6.5	-5.2	-7.3	0.2	0.1	0.1
Denmark	-0.8	0.6	-4.0	-4.5	3.8	3.5	3.3
Estonia	1.7	-4.3	-5.7	-3.1	0.1	0.2	0.2
Finland	-28.8	-40.1	-35.9	-38.4	6.0	6.4	6.5
France	-42.1	-63.1	-61.2	-70.2	20.9	20.7	22.0
Germany	-70.5	-35.0	-52.1	-51.9	29.8	29.3	30.6
Greece	-1.8	-2.0	-2.0	-2.0	-0.7	-0.5	-0.3
Hungary	-0.5	-4.7	-3.1	-3.8	-0.7	-0.9	-1.3
Iceland	-0.1	-0.2	-0.2	-0.3	1.1	1.1	1.1
Ireland	-2.3	-3.5	-4.5	-3.9	0	0.1	0.3
Italy	-27.2	-36.3	-36.5	-30.1	2.0	1.4	1.3
Latvia	-14.4	-13.4	-11.5	-13.3	1.6	1.6	1.4
Liechtenstein	0	0	0	0	0	0	0
Lithuania	-9.6	-3.1	-10.9	-9.5	3.6	2.4	3.6
Luxembourg	-0.6	-0.6	-0.5	-0.5	0	0	0
Malta	0	0	0	0	0	0	0
Monaco	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Montenegro	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Netherlands	-3.0	-3.3	-3.5	-3.5	0.5	0.7	1.2
Norway	-27.6	-28.7	-30.9	-30.8	2.0	1.9	1.9
Poland	-39.3	-53.5	-37.0	-39.6	2.2	2.1	1.4
Portugal	-12.1	-8.5	-16.1	-15.0	1.8	1.3	0.6
Romania	-25.1	-24.1	-24.8	-22.5	-1.9	-1.7	-1.5
San Marino	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Serbia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Slovakia	-8.6	-3.9	-4.8	-7.2	-0.6	-0.7	-0.8
Slovenia	-7.5	-7.5	-6.8	-6.7	0.5	0.5	0.5
Spain	-30.7	-32.7	-34.2	-34.0	-0.8	-0.6	-1.3
Sweden	-47.9	-35.7	-40.9	-42.5	1.9	1.9	2.1
Switzerland	-0.9	-3.1	-2.5	-2.7	0	0.3	0.7
The former Yugoslav Republic of Macedonia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
United Kingdom	-17.0	-18.0	-18.0	-16.7	15.9	14.3	12.6
ECE Central	-462.3	-463.2	-479.5	-485.3	93.2	89.5	90.1
Armenia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Azerbaijan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Georgia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Israel	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kazakhstan	-1.0	-3.0	-5.3	-9.1	0	0.1	0
Kyrgyzstan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Tajikistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Turkey	-52.0	-51.3	-58.8	-60.8	0.2	0.1	-0.1
Turkmenistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Uzbekistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE South-East	-53.0	-54.2	-64.1	-69.9	0.2	0.2	-0.1
Canada	-64.5	43.8	68.1	n.a.	0.3	-3.8	-5.0
United States of America	-426.4	-824.4	-796.4	-800.0	-14.7	-0.4	-2.2
ECE West	-491.0	-780.6	-728.3	-800.0	-14.4	-4.2	-7.2
ECE Total	-1,662.6	-1,961.5	-2,038.1	-2,120.3	287.7	266.8	280.2
EU-28	-433.7	-431.2	-446.0	-451.6	90.0	86.2	86.5

Data sources: UNFCCC (2015).

Land-use, land-use change and forestry (LULUCF), National total emissions, minus being a sink, plus being a source						Country
Grassland (Tg CO ₂ equivalent)			Wetlands (Tg CO ₂ equivalent)			
2000	2005	2010	2000	2005	2010	
n.a.	n.a.	n.a.	0.1	0.1	0	Belarus
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Moldova
-106.6	-153.0	-99.4	18.1	17.4	15.3	Russian Federation
1.3	2.1	3.0	0	0	0	Ukraine
-105.3	-150.9	-96.4	18.2	17.5	15.4	ECE East
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Albania
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Andorra
0.1	0.4	0	0	0	0.1	Austria
0.4	0.2	-0.1	0	0	0	Belgium
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Bosnia and Herzegovina
-0.6	-0.6	-0.6	0.1	0.2	0.2	Bulgaria
-0.1	-0.2	-0.1	0	0	0	Croatia
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Cyprus
-0.4	-0.4	-0.4	0	0	0	Czech Republic
0.2	0.2	0.2	0	0.1	0.1	Denmark
-0.2	-1.4	0.4	0.1	0.1	0.2	Estonia
0.5	0.5	0.3	1.6	1.6	1.8	Finland
-16.9	-12.6	-11.6	-2.1	-1.8	-2.4	France
11.1	10.0	10.4	2.6	2.5	2.2	Germany
-0.2	-0.3	-0.7	0	0	0	Greece
0.3	0.3	0.2	0	0	0	Hungary
-0.1	-0.1	-0.2	0	0	0	Iceland
0.7	0.2	0.1	0.5	0.4	0	Ireland
0.3	-2.8	-4.1	n.a.	n.a.	n.a.	Italy
-0.1	-0.3	-0.6	0	0	0	Latvia
0	0	0	0	0	0	Liechtenstein
-4.4	-4.7	-3.3	0.1	0.1	0.1	Lithuania
0	0	-0.1	0	0	0	Luxembourg
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Malta
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Monaco
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Montenegro
4.1	3.8	4.1	0	0	0.1	Netherlands
0.3	0.3	0.3	-0.1	0	-0.1	Norway
0.8	0.6	0.4	2.9	3.1	3.1	Poland
1.9	1.3	0.5	0.3	0.4	0.4	Portugal
-0.6	-0.5	0.2	-0.1	-0.3	-0.1	Romania
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	San Marino
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Serbia
-0.7	-0.2	-0.2	n.a.	n.a.	n.a.	Slovakia
0.8	0.9	0.9	0	0.1	0.1	Slovenia
-0.4	0.1	0.7	0	-0.1	0	Spain
-0.3	-0.2	0.2	0.1	0.1	0.1	Sweden
0.3	0.2	0.3	0	0	0	Switzerland
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	The former Yugoslav Republic of Macedonia
-7.4	-7.8	-7.9	0.5	0.5	0.4	United Kingdom
-10.7	-13.3	-10.6	6.7	7.0	6.3	ECE Central
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Armenia
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Azerbaijan
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Georgia
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Israel
-21.9	-13.6	-14.7	0	0	0.4	Kazakhstan
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Kyrgyzstan
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Tajikistan
1.4	1.1	1.1	0.3	0.4	0	Turkey
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Turkmenistan
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Uzbekistan
-20.5	-12.6	-13.6	0.3	0.4	0.4	ECE South-East
0.9	0.8	0.3	3.1	3.1	2.7	Canada
-41.9	-2.7	-1.9	1.2	1.1	1.0	United States of America
-40.9	-1.9	-1.6	4.4	4.2	3.7	ECE West
-177.4	-178.7	-122.2	29.6	29.0	25.8	ECE Total
-11.1	-13.7	-11.0	6.7	7.0	6.3	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 5b
LULUCF

Country	Land-use, land-use change and forestry (LULUCF), National total emissions, minus being a sink, plus being a source					
	Settlements (Tg CO ₂ equivalent)			Other land (Tg CO ₂ equivalent)		
	2000	2005	2010	2000	2005	2010
Belarus	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Moldova	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Russian Federation	27.8	26.1	14.3	18.7	18.7	0.3
Ukraine	n.a.	0.0	0.0	0.0	n.a.	n.a.
ECE East	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Albania	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Andorra	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Austria	0.1	0.2	0.1	0.4	0.3	0.2
Belgium	0.5	0.6	0.6	0.0	0.1	0.1
Bosnia and Herzegovina	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Bulgaria	0.7	0.7	1.0	n.a.	n.a.	n.a.
Croatia	0.4	0.5	0.6	n.a.	n.a.	n.a.
Cyprus	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Czech Republic	0.1	0.2	0.1	n.a.	n.a.	n.a.
Denmark	0.0	0.0	0.0	n.a.	n.a.	n.a.
Estonia	0.1	0.3	0.3	n.a.	0.1	0.1
Finland	1.5	2.0	1.2	n.a.	n.a.	n.a.
France	10.9	13.1	13.5	0	0	0
Germany	2.5	2.0	3.7	n.a.	n.a.	n.a.
Greece	0.0	0.0	0.0	0.1	0.1	0.1
Hungary	0.2	0.2	0.2	n.a.	n.a.	n.a.
Iceland	0.0	0.0	0.0	n.a.	n.a.	n.a.
Ireland	0.2	0.3	0.2	0	0	0
Italy	6.9	7.7	7.8	n.a.	n.a.	n.a.
Latvia	0.4	0.7	0.8	n.a.	n.a.	n.a.
Liechtenstein	0.0	0.0	0.0	0	0	0
Lithuania	0.9	0.5	n.a.	n.a.	n.a.	n.a.
Luxembourg	0.1	0.1	0.1	0	0	0
Malta	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Monaco	0.0	0.0	0.0	n.a.	n.a.	n.a.
Montenegro	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Netherlands	0.5	0.8	1.1	0.1	0.1	0.1
Norway	1.5	1.4	1.9	0	0	0
Poland	0.2	0.1	0.1	n.a.	n.a.	n.a.
Portugal	1.2	1.8	2.2	-2.5	-2.9	-2.6
Romania	0.5	0.7	0.5	1.5	0.5	1.2
San Marino	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Serbia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Slovakia	0.1	0.1	0.1	0.1	0.2	0.1
Slovenia	0.7	0.7	0.7	0.2	0.2	0.2
Spain	0.7	1.1	1.1	0	0	0
Sweden	3.8	2.9	3.3	n.a.	n.a.	n.a.
Switzerland	0.4	0.4	0.3	0.1	0.1	0.1
The former Yugoslav Republic of Macedonia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
United Kingdom	6.5	6.3	6.2	0	0	0
ECE Central	41.4	45.4	48.0	n.a.	n.a.	n.a.
Armenia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Azerbaijan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Georgia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Israel	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kazakhstan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kyrgyzstan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Tajikistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Turkey	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Turkmenistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Uzbekistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE South-East	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Canada	8.7	9.5	9.6	n.a.	n.a.	n.a.
United States of America	-74.9	-80.5	-86.1	n.a.	n.a.	n.a.
ECE West	-66.2	-71.0	-76.5	n.a.	n.a.	n.a.
ECE Total	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
EU-28	39.5	43.6	45.7	-0.1	-1.4	-0.5

Data sources: UNFCCC (2015).

Land-use, land-use change and forestry (LULUCF), National total emissions, minus being a sink, plus being a source			Country
Other (Tg CO ₂ equivalent)			
2000	2005	2010	
n.a.	n.a.	n.a.	Belarus
n.a.	n.a.	n.a.	Moldova
n.a.	n.a.	n.a.	Russian Federation
n.a.	n.a.	n.a.	Ukraine
n.a.	n.a.	n.a.	ECE East
n.a.	n.a.	n.a.	Albania
n.a.	n.a.	n.a.	Andorra
n.a.	n.a.	n.a.	Austria
n.a.	n.a.	n.a.	Belgium
n.a.	n.a.	n.a.	Bosnia and Herzegovina
n.a.	n.a.	n.a.	Bulgaria
n.a.	n.a.	n.a.	Croatia
n.a.	n.a.	n.a.	Cyprus
0	0	0	Czech Republic
n.a.	n.a.	n.a.	Denmark
n.a.	n.a.	n.a.	Estonia
-1.3	-0.3	0.6	Finland
-0.1	-0.4	-0.5	France
0.1	0.1	0.1	Germany
n.a.	n.a.	n.a.	Greece
n.a.	n.a.	n.a.	Hungary
n.a.	n.a.	n.a.	Iceland
n.a.	n.a.	n.a.	Ireland
n.a.	n.a.	n.a.	Italy
-1.9	-2.3	-1.7	Latvia
n.a.	n.a.	n.a.	Liechtenstein
n.a.	n.a.	n.a.	Lithuania
n.a.	n.a.	0	Luxembourg
n.a.	n.a.	n.a.	Malta
0.0	0.0	0.0	Monaco
n.a.	n.a.	n.a.	Montenegro
0.1	0.1	0.1	Netherlands
0.0	0.0	0.0	Norway
n.a.	n.a.	n.a.	Poland
-1.0	-0.8	-0.5	Portugal
0.0	0.0	0.0	Romania
n.a.	n.a.	n.a.	San Marino
n.a.	n.a.	n.a.	Serbia
n.a.	n.a.	n.a.	Slovakia
n.a.	n.a.	n.a.	Slovenia
n.a.	n.a.	n.a.	Spain
n.a.	n.a.	n.a.	Sweden
n.a.	n.a.	n.a.	Switzerland
n.a.	n.a.	n.a.	The former Yugoslav Republic of Macedonia
-0.8	-0.7	-1.0	United Kingdom
n.a.	n.a.	n.a.	ECE Central
n.a.	n.a.	n.a.	Armenia
n.a.	n.a.	n.a.	Azerbaijan
n.a.	n.a.	n.a.	Georgia
n.a.	n.a.	n.a.	Israel
n.a.	n.a.	n.a.	Kazakhstan
n.a.	n.a.	n.a.	Kyrgyzstan
n.a.	n.a.	n.a.	Tajikistan
n.a.	n.a.	n.a.	Turkey
n.a.	n.a.	n.a.	Turkmenistan
n.a.	n.a.	n.a.	Uzbekistan
n.a.	n.a.	n.a.	ECE South-East
n.a.	n.a.	n.a.	Canada
-126.6	-114.8	-72.8	United States of America
n.a.	n.a.	n.a.	ECE West
n.a.	n.a.	n.a.	ECE Total
-4.8	-4.3	-2.9	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 6a
Increment and fellings

Country	Wood on forest available for wood supply					
	Gross annual increment (1,000 m ³)			Natural losses (1,000 m ³)		
	2000	2005	2010	2000	2005	2010
Belarus	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Moldova	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Russian Federation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Ukraine	28,757	28,500	28,500	5,377	7,100	7,100
ECE East	28,757	28,500	28,500	5,377	7,100	7,100
Albania	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Andorra	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Austria	31,255	30,622	30,622	2,337	5,486	5,486
Belgium	4,801	4,825	4,829	218	219	219
Bosnia and Herzegovina	n.a.	n.a.	9,311	n.a.	n.a.	n.a.
Bulgaria	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Croatia	9,343	9,667	9,438	1,281	1,325	1,294
Cyprus	46	45	52	4	5	5
Czech Republic	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Denmark	5,156	4,626	6,708	454	432	445
Estonia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Finland	83,189	93,867	98,175	2,854	4,280	4,796
France	n.a.	n.a.	101,112	n.a.	n.a.	6,745
Germany	121,650	121,533	121,533	2,890	2,921	2,943
Greece	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Hungary	11,158	11,754	12,149	2,813	2,006	2,375
Iceland	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Ireland	6,963	6,963	6,963	285	285	285
Italy	34,510	35,872	37,235	4,348	4,520	4,692
Latvia	25,280	25,280	25,770	6,090	6,090	6,090
Liechtenstein	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Lithuania	10,430	10,430	14,360	2,570	2,570	3,330
Luxembourg	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Malta	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Monaco	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Montenegro	1,394	1,394	2,525	279	279	506
Netherlands	2,382	2,895	2,895	155	157	157
Norway	29,869	31,280	29,305	3,709	3,885	3,554
Poland	72,600	72,600	72,600	10,300	10,300	10,300
Portugal	20,197	20,002	20,002	1,143	1,132	1,132
Romania	34,037	34,171	34,833	5,446	5,467	5,573
San Marino	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Serbia	6,600	6,700	10,300	n.a.	n.a.	n.a.
Slovakia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Slovenia	7,974	8,959	9,958	635	714	793
Spain	33,642	35,418	37,195	1,552	1,634	1,716
Sweden	83,797	83,797	85,308	9,638	9,638	5,961
Switzerland	9,693	10,103	10,513	1,937	1,724	1,512
The former Yugoslav Republic of Macedonia	1,624	1,624	1,624	n.a.	n.a.	n.a.
United Kingdom	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE Central	647,589	664,426	795,315	60,939	65,069	69,908
Armenia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Azerbaijan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Georgia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Israel	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kazakhstan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kyrgyzstan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Tajikistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Turkey	32,492	34,245	37,264	1,656	1,472	2,005
Turkmenistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Uzbekistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE South-East	32,492	34,245	37,264	1,656	1,472	2,005
Canada	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
United States of America	1,208,000	1,307,000	1,331,000	319,500	363,000	398,000
ECE West	1,208,000	1,307,000	1,331,000	319,500	363,000	398,000
ECE Total	1,916,838	2,034,171	2,192,079	387,472	436,641	477,013
EU-28	598,409	613,325	731,736	55,014	59,181	64,336

Data sources: FAO/FRA (2000, 2005, 2010). Joint FOREST EUROPE/UNECE/FAO pan-European reporting (2011, 2014), national contacts and sources, secretariat's estimates - for more detailed information about sources of data and methods of estimation see web-based version.

Wood on forest available for wood supply			Country
Net annual increment (1,000 m ³)			
2000	2005	2010	
22,796	22,809	29,975	Belarus
n.a.	n.a.	n.a.	Moldova
841,050	848,841	852,927	Russian Federation
23,880	22,071	21,400	Ukraine
887,726	893,721	904,302	ECE East
875	470	224	Albania
n.a.	n.a.	n.a.	Andorra
28,918	25,136	25,136	Austria
4,583	4,607	4,610	Belgium
5,480	5,480	n.a.	Bosnia and Herzegovina
13,563	14,120	14,361	Bulgaria
8,062	8,342	8,144	Croatia
42	40	47	Cyprus
20,924	21,566	20,463	Czech Republic
4,702	4,194	6,263	Denmark
11,768	11,361	11,514	Estonia
80,335	89,587	93,379	Finland
97,578	102,456	94,367	France
118,761	118,612	118,590	Germany
n.a.	n.a.	n.a.	Greece
8,344	9,747	9,775	Hungary
6	13	24	Iceland
6,678	6,678	6,678	Ireland
30,162	31,352	32,543	Italy
16,500	19,680	19,680	Latvia
25	25	25	Liechtenstein
11,460	11,460	11,030	Lithuania
650	650	650	Luxembourg
n.a.	n.a.	n.a.	Malta
n.a.	n.a.	n.a.	Monaco
1,115	1,115	2,020	Montenegro
2,227	2,738	2,738	Netherlands
26,159	27,395	25,750	Norway
67,595	67,595	62,300	Poland
19,054	18,870	18,870	Portugal
28,591	28,704	29,260	Romania
n.a.	n.a.	n.a.	San Marino
n.a.	n.a.	n.a.	Serbia
11,748	12,916	13,465	Slovakia
7,339	8,245	9,165	Slovenia
32,090	33,784	35,479	Spain
74,160	74,160	79,347	Sweden
7,756	8,379	9,001	Switzerland
n.a.	n.a.	n.a.	The former Yugoslav Republic of Macedonia
21,070	21,962	23,113	United Kingdom
768,319	791,440	788,010	ECE Central
n.a.	n.a.	n.a.	Armenia
n.a.	n.a.	n.a.	Azerbaijan
1,800	1,800	1,800	Georgia
n.a.	n.a.	n.a.	Israel
n.a.	n.a.	n.a.	Kazakhstan
n.a.	n.a.	n.a.	Kyrgyzstan
n.a.	n.a.	n.a.	Tajikistan
30,836	32,773	35,259	Turkey
n.a.	n.a.	n.a.	Turkmenistan
n.a.	n.a.	n.a.	Uzbekistan
32,636	34,573	37,059	ECE South-East
n.a.	n.a.	n.a.	Canada
888,500	944,000	933,000	United States of America
888,500	944,000	933,000	ECE West
2,577,181	2,663,734	2,662,371	ECE Total
726,903	748,562	750,966	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 6b
Increment and fellings

Country	Wood on forest available for wood supply			
	Fellings total (1,000 m ³)			Ratio Net annual increment/Fellings total in percent in 2010
	2000	2005	2010	2000
Belarus	10,787	14,109	14,136	47
Moldova	n.a.	n.a.	n.a.	n.a.
Russian Federation	166,000	186,000	175,000	20
Ukraine	8,352	12,827	12,827	35
ECE East	185,139	212,936	201,963	21
Albania	2,600	2,589	985	297
Andorra	n.a.	n.a.	n.a.	n.a.
Austria	17,490	23,511	23,511	60
Belgium	3,524	4,298	3,885	77
Bosnia and Herzegovina	3,614	n.a.	3,614	66
Bulgaria	4,017	5,747	5,877	30
Croatia	4,267	4,931	5,459	53
Cyprus	24	10	9	58
Czech Republic	15,824	18,212	17,436	76
Denmark	4,724	4,235	3,925	100
Estonia	12,412	6,662	7,337	105
Finland	69,033	69,093	68,174	86
France	67,385	59,262	64,316	69
Germany	91,175	93,871	95,171	77
Greece	2,221	1,842	n.a.	n.a.
Hungary	6,992	6,957	7,450	84
Iceland	0	1	3	7
Ireland	3,504	3,504	3,504	52
Italy	14,327	13,298	12,755	48
Latvia	14,481	14,231	12,831	88
Liechtenstein	21	27	29	82
Lithuania	10,020	10,020	8,640	87
Luxembourg	0	0	0	0
Malta	n.a.	n.a.	n.a.	n.a.
Monaco	n.a.	n.a.	n.a.	n.a.
Montenegro	570	548	503	51
Netherlands	1,354	1,314	1,295	61
Norway	11,151	11,710	12,902	43
Poland	31,389	38,316	46,600	46
Portugal	12,650	14,229	14,229	66
Romania	14,088	16,473	17,600	49
San Marino	n.a.	n.a.	n.a.	n.a.
Serbia	2,600	2,700	5,800	n.a.
Slovakia	6,683	9,146	10,427	57
Slovenia	2,547	3,232	3,401	35
Spain	16,873	17,369	19,706	53
Sweden	87,700	87,700	80,800	118
Switzerland	7,361	7,389	7,416	95
The former Yugoslav Republic of Macedonia	n.a.	n.a.	n.a.	n.a.
United Kingdom	9,678	10,551	11,683	46
ECE Central	552,300	562,979	577,273	72
Armenia	n.a.	n.a.	n.a.	n.a.
Azerbaijan	n.a.	n.a.	n.a.	n.a.
Georgia	n.a.	n.a.	n.a.	n.a.
Israel	0	0	0	n.a.
Kazakhstan	n.a.	n.a.	n.a.	n.a.
Kyrgyzstan	n.a.	n.a.	n.a.	n.a.
Tajikistan	n.a.	n.a.	n.a.	n.a.
Turkey	n.a.	n.a.	n.a.	n.a.
Turkmenistan	n.a.	n.a.	n.a.	n.a.
Uzbekistan	n.a.	n.a.	n.a.	n.a.
ECE South-East	n.a.	n.a.	n.a.	n.a.
Canada	201,843	203,325	141,937	n.a.
United States of America	557,000	548,000	454,000	n.a.
ECE West	758,843	751,325	595,937	n.a.
ECE Total	1,496,363	1,527,267	1,375,200	n.a.
EU-28	524,383	538,016	546,022	n.a.

Data sources: FAO/FRA (2000, 2005, 2010). Joint A1:R68 EUROPE/UNECE/FAO pan-European reporting (2011, 2014), national contacts and sources, secretariat's estimates - for more detailed information about sources of data and methods of estimation see web-based version.

Wood on forest available for wood supply					Country
Ratio Net annual increment/Fellings total in percent in 2010	Fellings of which: of natural losses (1,000 m ³)				
	2010	2000	2005	2010	
47	n.a.	n.a.	n.a.	n.a.	Belarus
n.a.	n.a.	n.a.	n.a.	n.a.	Moldova
21	n.a.	n.a.	n.a.	n.a.	Russian Federation
60	3,116	n.a.	n.a.	5,060	Ukraine
22	n.a.	n.a.	n.a.	n.a.	ECE East
440	n.a.	n.a.	n.a.	n.a.	Albania
n.a.	n.a.	n.a.	n.a.	n.a.	Andorra
94	1,030	3,107	3,107	3,107	Austria
84	n.a.	n.a.	n.a.	n.a.	Belgium
n.a.	n.a.	n.a.	n.a.	n.a.	Bosnia and Herzegovina
41	933	921	921	712	Bulgaria
67	559	753	753	659	Croatia
20	n.a.	n.a.	n.a.	n.a.	Cyprus
85	3,868	9,093	9,093	6,848	Czech Republic
63	36	40	40	42	Denmark
64	610	391	391	536	Estonia
73	777	572	572	572	Finland
68	21,000	n.a.	n.a.	14,000	France
80	11,860	16,371	16,371	15,223	Germany
n.a.	n.a.	n.a.	n.a.	n.a.	Greece
76	325	426	426	350	Hungary
13	n.a.	n.a.	n.a.	n.a.	Iceland
52	110	110	110	110	Ireland
39	217	226	226	235	Italy
65	667	1,618	1,618	701	Latvia
115	n.a.	n.a.	n.a.	n.a.	Liechtenstein
78	700	700	700	710	Lithuania
0	n.a.	n.a.	n.a.	n.a.	Luxembourg
n.a.	n.a.	n.a.	n.a.	n.a.	Malta
n.a.	n.a.	n.a.	n.a.	n.a.	Monaco
25	14	16	16	34	Montenegro
47	n.a.	n.a.	n.a.	n.a.	Netherlands
50	234	246	246	271	Norway
75	8,647	9,587	9,587	9,300	Poland
75	633	711	711	711	Portugal
60	1,634	1,640	1,640	1,672	Romania
n.a.	n.a.	n.a.	n.a.	n.a.	San Marino
n.a.	n.a.	n.a.	n.a.	n.a.	Serbia
77	2,759	4,701	4,701	5,939	Slovakia
37	440	909	909	763	Slovenia
56	n.a.	n.a.	n.a.	n.a.	Spain
102	7,453	7,453	7,453	3,446	Sweden
82	2,822	1,758	1,758	694	Switzerland
n.a.	n.a.	n.a.	n.a.	n.a.	The former Yugoslav Republic of Macedonia
51	n.a.	n.a.	n.a.	n.a.	United Kingdom
73	67,328	61,350	61,350	66,635	ECE Central
n.a.	n.a.	n.a.	n.a.	n.a.	Armenia
n.a.	n.a.	n.a.	n.a.	n.a.	Azerbaijan
n.a.	n.a.	n.a.	n.a.	n.a.	Georgia
n.a.	n.a.	n.a.	n.a.	n.a.	Israel
n.a.	n.a.	n.a.	n.a.	n.a.	Kazakhstan
n.a.	n.a.	n.a.	n.a.	n.a.	Kyrgyzstan
n.a.	n.a.	n.a.	n.a.	n.a.	Tajikistan
n.a.	n.a.	n.a.	n.a.	n.a.	Turkey
n.a.	n.a.	n.a.	n.a.	n.a.	Turkmenistan
n.a.	n.a.	n.a.	n.a.	n.a.	Uzbekistan
n.a.	n.a.	n.a.	n.a.	n.a.	ECE South-East
n.a.	n.a.	n.a.	n.a.	n.a.	Canada
49	n.a.	n.a.	n.a.	n.a.	United States of America
n.a.	n.a.	n.a.	n.a.	n.a.	ECE West
n.a.	n.a.	n.a.	n.a.	n.a.	ECE Total
n.a.	n.a.	n.a.	n.a.	n.a.	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 7
Roundwood removals

Country	Removals of industrial wood, other industrial wood and wood fuel, 1000 m ³ u.b.							
	2000	2001	2002	2003	2004	2005	2006	2007
Belarus	7,185	6,958	7,511	10,073	10,455	10,529	10,603	10,603
Moldova	368	347	394	429	405	391	397	369
Russian Federation	170,968	178,104	178,427	188,162	192,920	196,812	206,114	222,872
Ukraine	10,634	10,666	13,302	14,705	15,803	15,482	16,865	17,852
ECE East	189,155	196,075	199,634	213,369	219,583	223,214	233,979	251,696
Albania	447	265	305	309	309	309	309	495
Andorra	0	0	0	0	0	0	0	0
Austria	13,276	13,467	14,846	17,055	16,483	16,471	19,135	21,317
Belgium	4,610	4,415	4,700	4,965	5,025	5,130	5,250	5,190
Bosnia and Herzegovina	4,581	4,104	4,528	4,391	4,233	4,065	4,368	3,991
Bulgaria	4,878	4,086	4,927	4,927	6,079	5,955	6,082	5,776
Croatia	3,835	3,690	3,932	4,066	4,096	4,284	4,807	4,566
Cyprus	21	18	15	12	10	10	7	20
Czech Republic	14,841	14,764	14,921	15,530	15,991	15,900	17,771	18,607
Denmark	3,525	1,857	1,628	1,799	1,533	2,988	2,384	2,653
Estonia	9,530	11,350	11,680	11,650	7,500	5,900	5,500	4,599
Finland	54,262	52,210	53,389	54,240	54,398	52,250	50,812	56,612
France	66,278	60,131	55,199	52,959	53,289	52,890	53,700	54,911
Germany	58,143	42,876	45,291	54,880	58,225	60,455	65,121	80,896
Greece	2,335	2,020	1,681	1,744	1,781	1,622	1,639	1,935
Hungary	7,216	7,279	6,792	6,635	6,420	7,043	6,939	6,693
Iceland	0	0	0	0	0	0	0	0
Ireland	2,673	2,455	2,773	2,821	2,660	2,755	2,778	2,835
Italy	10,208	8,896	7,869	8,632	9,599	9,601	9,566	9,044
Latvia	14,769	13,413	14,013	13,474	13,354	13,467	13,680	13,333
Liechtenstein	24	22	22	22	22	22	25	25
Lithuania	5,550	5,730	6,135	6,290	6,130	6,050	5,870	6,195
Luxembourg	316	291	273	275	282	257	276	293
Malta	0	0	0	0	0	0	0	0
Monaco	0	0	0	0	0	0	0	0
Montenegro	0	0	0	0	0	0	468	468
Netherlands	1,149	949	955	1,170	1,059	1,154	1,139	1,042
Norway	8,180	9,022	8,678	8,324	8,812	9,692	9,819	10,493
Poland	27,917	26,692	28,912	33,025	35,034	34,121	34,439	37,824
Portugal	11,011	9,126	8,922	9,853	11,049	10,926	10,985	11,002
Romania	15,466	14,442	17,721	17,539	17,905	16,318	16,215	15,888
San Marino	0	0	0	0	0	0	2,936	3,025
Serbia	3,480	2,546	3,018	3,221	3,609	3,222	0	0
Slovakia	6,365	6,230	5,984	6,656	7,660	9,833	8,652	8,171
Slovenia	2,458	2,665	2,708	2,960	2,722	2,832	3,218	2,923
Spain	14,971	15,806	16,713	17,010	17,210	16,332	16,421	15,011
Sweden	63,800	63,700	67,100	67,600	67,800	98,700	65,100	78,700
Switzerland	9,238	5,662	4,557	5,120	5,132	5,313	5,722	5,541
The former Yugoslav Republic of Macedonia	1,060	750	723	818	851	836	849	660
United Kingdom	8,205	8,316	8,132	8,399	8,685	8,975	8,854	9,471
ECE Central	454,617	419,245	429,041	448,372	454,949	485,678	460,836	500,207
Armenia	57	49	54	66	65	43	68	46
Azerbaijan	14	14	62	8	8	8	8	8
Georgia	423	329	419	491	593	697	641	838
Israel	103	34	34	34	34	34	34	34
Kazakhstan	663	761	508	314	500	916	123	267
Kyrgyzstan	53	50	41	42	32	32	32	32
Tajikistan	0	0	0	0	90	90	90	90
Turkey	17,821	17,076	18,023	17,752	18,215	17,877	19,914	18,535
Turkmenistan	3	3	3	3	3	3	10	10
Uzbekistan	29	33	32	28	27	37	40	41
ECE South-East	19,166	18,349	19,176	18,738	19,567	19,737	20,960	19,901
Canada	205,410	191,302	201,375	182,957	211,655	207,447	187,715	166,993
United States of America	475,044	458,162	456,989	457,518	470,744	476,352	466,110	434,332
ECE West	680,454	649,464	658,364	640,475	682,399	683,799	653,825	601,325
ECE Total	1,343,392	1,283,133	1,306,215	1,320,954	1,376,498	1,412,428	1,369,600	1,373,128
EU-28	427,607	396,875	407,210	426,166	431,981	462,218	436,340	475,508

Data sources: FAOSTAT (2015).

Removals of industrial wood, other industrial wood and wood fuel, 1000 m³ u.b.							Country
2008	2009	2010	2011	2012	2013		
10,603	10,954	12,885	12,885	18,929	19,156	Belarus	
369	369	369	369	521	551	Moldova	
175,291	171,832	189,783	207,250	207,510	210,169	Russian Federation	
17,852	14,865	16,845	18,082	18,026	18,493	Ukraine	
204,115	198,020	219,882	238,586	244,986	248,370	ECE East	
495	495	495	1,245	1,245	1,245	Albania	
0	0	0	0	0	0	Andorra	
21,795	16,727	17,831	18,696	18,021	17,390	Austria	
4,860	4,545	4,996	5,301	5,301	5,301	Belgium	
4,256	3,609	3,824	4,087	4,017	4,194	Bosnia and Herzegovina	
6,165	4,646	5,746	6,295	6,054	6,743	Bulgaria	
4,913	4,652	4,625	5,331	5,793	5,584	Croatia	
20	10	9	9	11	9	Cyprus	
16,286	15,592	16,835	15,472	15,147	15,418	Czech Republic	
2,881	2,909	2,759	2,666	2,529	2,417	Denmark	
4,905	5,463	7,272	7,164	7,344	7,542	Estonia	
50,670	41,653	50,952	50,767	52,310	56,992	Finland	
53,098	54,779	56,129	55,549	52,041	52,320	France	
58,277	50,718	57,398	59,234	55,358	56,122	Germany	
1,935	1,034	1,048	1,257	1,935	1,935	Greece	
5,524	5,777	6,453	7,060	6,664	6,900	Hungary	
0	0	0	6	6	6	Iceland	
2,319	2,516	2,737	2,748	2,707	2,868	Ireland	
9,717	8,978	8,572	8,455	8,455	8,455	Italy	
9,715	11,201	13,385	13,577	13,425	13,284	Latvia	
28	25	25	26	23	19	Liechtenstein	
5,594	5,460	7,097	7,004	6,921	7,053	Lithuania	
355	294	295	281	281	281	Luxembourg	
0	0	0	0	0	0	Malta	
0	0	0	0	0	0	Monaco	
496	371	922	922	922	922	Montenegro	
1,148	1,064	1,133	1,043	974	1,122	Netherlands	
10,358	8,905	10,470	10,313	10,595	11,598	Norway	
35,995	36,115	36,890	38,644	39,302	40,231	Poland	
10,349	9,744	9,830	11,133	11,014	10,805	Portugal	
14,328	13,434	13,637	15,099	17,000	16,099	Romania	
3,292	3,228	7,731	7,795	7,620	7,747	San Marino	
0	0	0	0	0	0	Serbia	
9,324	9,122	9,630	9,251	8,223	8,080	Slovakia	
3,050	2,994	3,019	3,478	3,404	3,531	Slovenia	
17,616	14,429	16,506	15,761	14,928	15,565	Spain	
71,300	65,600	72,700	72,400	69,999	69,400	Sweden	
4,968	4,717	4,955	4,877	4,673	4,789	Switzerland	
748	664	652	620	798	707	The former Yugoslav Republic of Macedonia	
8,923	9,190	10,242	10,567	10,651	11,383	United Kingdom	
455,705	420,663	466,799	474,131	465,691	474,056	ECE Central	
1,370	1,502	1,751	2,075	2,077	2,078	Armenia	
8	8	8	8	8	8	Azerbaijan	
838	838	838	838	420	626	Georgia	
34	34	34	34	34	34	Israel	
267	391	418	418	328	427	Kazakhstan	
32	42	51	51	51	51	Kyrgyzstan	
90	90	90	90	90	90	Tajikistan	
19,602	19,547	20,944	21,455	22,383	21,102	Turkey	
10	10	10	10	0	0	Turkmenistan	
38	38	38	41	46	46	Uzbekistan	
22,289	22,500	24,181	25,019	25,437	24,462	ECE South-East	
141,444	118,714	144,866	150,957	150,967	150,967	Canada	
388,721	340,839	332,297	350,307	345,314	346,424	United States of America	
530,165	459,553	477,163	501,264	496,281	497,391	ECE West	
1,212,274	1,100,735	1,188,024	1,239,000	1,232,395	1,244,279	ECE Total	
431,064	398,648	437,725	444,242	435,792	442,829	EU-28	

ANNEX 3: SOURCE DATA TABLES

Table 8a
Disturbances affecting forest health and vitality

Country	Disturbances affecting forest health and vitality					
	Forest area affected by forest fires (1,000 ha)			Other wooded land area affected by forest fires (1,000 ha)		
	2000	2005	2010	2000	2005	2010
Belarus	6	1	0	n.a.	n.a.	n.a.
Moldova	0.03	0.16	n.a.	n.a.	n.a.	n.a.
Russian Federation	1,162.3	991.4	2,475.3	105.2	89.7	n.a.
Ukraine	1.6	5.3	2.7	n.a.	n.a.	n.a.
ECE East	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Albania	3.7	6.2	1.1	0.8	1.3	2
Andorra	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Austria	0.04	0.03	0.03	n.a.	n.a.	n.a.
Belgium	0.01	0	0.02	0.002	0.001	0.399
Bosnia and Herzegovina	12.5	1.2	2.5	2.7	n.a.	n.a.
Bulgaria	45.4	1.4	5.9	5.2	0.3	0.6
Croatia	5.8	6.6	0.4	11.2	3.4	0.68
Cyprus	2.14	0.06	0.3	5.09	0.91	1.28
Czech Republic	0.38	0.23	0.21	0	0	n.a.
Denmark	0	0.01	0	0	0	n.a.
Estonia	0.8	0.81	0.28	n.a.	n.a.	n.a.
Finland	0.37	0.74	5	0	0	0
France	22	25	8.5	n.a.	n.a.	n.a.
Germany	0.58	0.18	0.52	n.a.	n.a.	n.a.
Greece	12.7	n.a.	n.a.	16.92	n.a.	n.a.
Hungary	1.2	1.8	0.76	n.a.	n.a.	n.a.
Iceland	0	0	0	0	0	0
Ireland	0.3	0.12	1.48	n.a.	n.a.	n.a.
Italy	49	18	16	9	3	3
Latvia	0.12	0.04	0.03	0	0	0
Liechtenstein	0	0	n.a.	n.a.	n.a.	n.a.
Lithuania	0.35	0.4	0.13	n.a.	0.039	n.a.
Luxembourg	0	0	0	0	0	n.a.
Malta	0.01	0	0	0	0	n.a.
Monaco	0	0	0	0	0	n.a.
Montenegro	1.5	4.8	13	n.a.	n.a.	n.a.
Netherlands	0.29	0.1	0.04	0	0	n.a.
Norway	0.1	0.53	0	0.07	0.54	n.a.
Poland	5.7	8.1	6	0	0	0
Portugal	69	214	46	91	125	87
Romania	3.61	0.16	0.21	n.a.	n.a.	n.a.
San Marino	0	0	n.a.	0	0	n.a.
Serbia	1.8	0	0.7	11.4	3.7	0.3
Slovakia	0.5	0.5	1.7	n.a.	n.a.	0
Slovenia	0.3	0.59	0.41	n.a.	n.a.	n.a.
Spain	45.9	69.4	10.19	141.67	119.3	44.59
Sweden	0.59	1.2	0.5	n.a.	n.a.	n.a.
Switzerland	0.1	0.04	0.02	n.a.	n.a.	n.a.
The former Yugoslav Republic of Macedonia	37.92	4.02	n.a.	0	0	n.a.
United Kingdom	2	0.2	0.9	n.a.	n.a.	n.a.
ECE Central	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Armenia	0.1	0.34	n.a.	n.a.	0.072	n.a.
Azerbaijan	0.1	0.04	n.a.	n.a.	n.a.	n.a.
Georgia	0.0	0.0	0.4	n.a.	n.a.	n.a.
Israel	0.77	1.01	5.41	0.49	0.33	n.a.
Kazakhstan	66.72	34.6	n.a.	n.a.	n.a.	n.a.
Kyrgyzstan	0.09	0.17	n.a.	0	0.02	n.a.
Tajikistan	1.1	0.5	n.a.	3	2.5	n.a.
Turkey	7.9	2	2	3.1	0.9	1.2
Turkmenistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Uzbekistan	0.07	0.12	n.a.	0	0	n.a.
ECE South-East	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Canada	655.3	1672	3055	n.a.	n.a.	n.a.
United States of America	2,244	2,638	1,039	374	440	173
ECE West	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE Total	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
EU-28	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Data sources: FAO/FRA (2000, 2005, 2010). Joint FOREST EUROPE/UNECE/FAO pan-European reporting (2011, 2014), national contacts and sources, secretariat's estimates - for more detailed information about sources of data and methods of estimation see web-based version.

Disturbances affecting forest health and vitality on forest area (UNECE)				Country
Insects and diseases (1,000 ha)				
2000	2005	2010		
244	205	169	Belarus	
n.a.	n.a.	n.a.	Moldova	
n.a.	n.a.	n.a.	Russian Federation	
1.7	4.3	6.4	Ukraine	
n.a.	n.a.	n.a.	ECE East	
n.a.	n.a.	n.a.	Albania	
n.a.	n.a.	n.a.	Andorra	
29.0	102.0	101.0	Austria	
45.1	46.1	17.1	Belgium	
n.a.	n.a.	n.a.	Bosnia and Herzegovina	
181	131.4	117	Bulgaria	
22.4	37.6	88.2	Croatia	
n.a.	6.3	1.2	Cyprus	
32.8	57.2	56.6	Czech Republic	
n.a.	4	6	Denmark	
n.a.	5.2	4	Estonia	
n.a.	n.a.	10.2	Finland	
n.a.	n.a.	n.a.	France	
121	193.3	143.9	Germany	
n.a.	n.a.	n.a.	Greece	
84.8	179.9	47.1	Hungary	
0	0	0	Iceland	
n.a.	n.a.	n.a.	Ireland	
n.a.	85.0	n.a.	Italy	
0.60	0.20	0.70	Latvia	
n.a.	n.a.	n.a.	Liechtenstein	
44.7	52.2	22.6	Lithuania	
n.a.	n.a.	n.a.	Luxembourg	
n.a.	n.a.	n.a.	Malta	
n.a.	n.a.	n.a.	Monaco	
n.a.	0	n.a.	Montenegro	
n.a.	n.a.	n.a.	Netherlands	
n.a.	n.a.	n.a.	Norway	
n.a.	n.a.	70	Poland	
259.8	275	290	Portugal	
1291	1322	78	Romania	
n.a.	n.a.	n.a.	San Marino	
85	118	20	Serbia	
15.2	12.3	14.2	Slovakia	
0.5	1	0.5	Slovenia	
n.a.	n.a.	n.a.	Spain	
191	192.4	275.5	Sweden	
n.a.	n.a.	n.a.	Switzerland	
n.a.	n.a.	n.a.	The former Yugoslav Republic of Macedonia	
n.a.	n.a.	n.a.	United Kingdom	
n.a.	n.a.	n.a.	ECE Central	
n.a.	46.3	n.a.	Armenia	
n.a.	4.5	n.a.	Azerbaijan	
1	6	26	Georgia	
n.a.	2.6	n.a.	Israel	
n.a.	n.a.	n.a.	Kazakhstan	
n.a.	29	n.a.	Kyrgyzstan	
n.a.	20.5	n.a.	Tajikistan	
333	184	438	Turkey	
n.a.	n.a.	n.a.	Turkmenistan	
0	16	n.a.	Uzbekistan	
n.a.	n.a.	n.a.	ECE South-East	
15,639	16,318	12,821	Canada	
n.a.	5,640	n.a.	United States of America	
n.a.	n.a.	n.a.	ECE West	
n.a.	n.a.	n.a.	ECE Total	
n.a.	n.a.	n.a.	EU-28	

ANNEX 3: SOURCE DATA TABLES

Table 8b
Disturbances affecting forest health and vitality

Country	Disturbances affecting forest health and vitality					
	Wildlife and grazing (1,000 ha)			Damage primarily human induced - forest operations (1,000 ha)		
	2000	2005	2010	2000	2005	2010
Belarus	n.a.	n.a.	n.a.	19	24	30
Moldova	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Russian Federation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Ukraine	n.a.	n.a.	n.a.	0	0	0
ECE East	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Albania	141	148	262	n.a.	n.a.	n.a.
Andorra	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Austria	824	766	711	233.0	183.0	135.0
Belgium	40.3	35.3	26.3	6.6	4.8	1.3
Bosnia and Herzegovina	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Bulgaria	0.3	1	0.2	0	0	0
Croatia	19.8	8.2	0.7	n.a.	n.a.	n.a.
Cyprus	n.a.	3.8	3.9	n.a.	0	0
Czech Republic	1.7	1.6	1.3	n.a.	n.a.	n.a.
Denmark	n.a.	4	2	n.a.	0	0
Estonia	6.5	2	1.2	n.a.	0	0
Finland	n.a.	n.a.	16.3	n.a.	n.a.	0
France	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Germany	33.8	15.1	12.9	n.a.	n.a.	n.a.
Greece	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Hungary	23.80	35.50	19.30	n.a.	n.a.	n.a.
Iceland	0	0	0	0	0	0
Ireland	n.a.	n.a.	24.9	n.a.	n.a.	n.a.
Italy	n.a.	396	25.9	n.a.	29	n.a.
Latvia	0.20	0.00	0.10	0	0	0
Liechtenstein	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Lithuania	17.4	12.2	7.9	0	0	0
Luxembourg	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Malta	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Monaco	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Montenegro	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Netherlands	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Norway	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Poland	n.a.	n.a.	46	n.a.	n.a.	7
Portugal	15.4	44.4	n.a.	n.a.	n.a.	n.a.
Romania	13	10	577	n.a.	n.a.	215
San Marino	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Serbia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Slovakia	0.8	1	0.2	n.a.	n.a.	n.a.
Slovenia	0	0	0	0.1	0.1	0.1
Spain	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sweden	424.2	456.5	407.5	18.2	36.5	45.8
Switzerland	0	0	0	n.a.	n.a.	n.a.
The former Yugoslav Republic of Macedonia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
United Kingdom	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE Central	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Armenia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Azerbaijan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Georgia	0	0	0	0	0	0
Israel	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kazakhstan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kyrgyzstan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Tajikistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Turkey	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Turkmenistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Uzbekistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE South-East	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Canada	n.a.	n.a.	n.a.	0	0	0
United States of America	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE West	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE Total	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
EU-28	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Data sources: FAO/FRA (2000, 2005, 2010). Joint FOREST EUROPE/UNECE/FAO pan-European reporting (2011, 2014), national contacts and sources, secretariat's estimates - for more detailed information about sources of data and methods of estimation see web-based version.

Disturbances affecting forest health and vitality				Country
Primarily damaged by abiotic agents (storm, wind, snow, etc.) (1,000 ha)				
2000	2005	2010		
1	8	12	Belarus	
n.a.	n.a.	n.a.	Moldova	
n.a.	n.a.	n.a.	Russian Federation	
6.4	7.7	8	Ukraine	
n.a.	n.a.	n.a.	ECE East	
n.a.	n.a.	n.a.	Albania	
n.a.	n.a.	n.a.	Andorra	
24.0	14.0	12.0	Austria	
2.6	2.1	2	Belgium	
n.a.	n.a.	n.a.	Bosnia and Herzegovina	
33.8	10.7	4.3	Bulgaria	
25.4	19.1	54.9	Croatia	
0	0	0	Cyprus	
10.9	10.2	15.6	Czech Republic	
20	3	3	Denmark	
6.9	11.2	6.6	Estonia	
n.a.	n.a.	20.8	Finland	
n.a.	n.a.	688	France	
3.7	27.9	4.9	Germany	
n.a.	n.a.	n.a.	Greece	
21.10	29.90	38.10	Hungary	
0	0	0	Iceland	
n.a.	n.a.	8	Ireland	
n.a.	535	9	Italy	
1.10	18.90	4.10	Latvia	
n.a.	n.a.	n.a.	Liechtenstein	
58.7	37.8	20.1	Lithuania	
n.a.	n.a.	n.a.	Luxembourg	
n.a.	n.a.	n.a.	Malta	
n.a.	n.a.	n.a.	Monaco	
n.a.	0	0	Montenegro	
n.a.	n.a.	n.a.	Netherlands	
n.a.	n.a.	n.a.	Norway	
n.a.	n.a.	10	Poland	
36.5	20.9	51.2	Portugal	
136.5	230.9	1.4	Romania	
n.a.	n.a.	n.a.	San Marino	
n.a.	n.a.	n.a.	Serbia	
6	10.9	8.4	Slovakia	
0.5	0.4	0.3	Slovenia	
n.a.	n.a.	61.9	Spain	
196.6	1,100.3	122.4	Sweden	
14.1	10.3	6.4	Switzerland	
n.a.	n.a.	n.a.	The former Yugoslav Republic of Macedonia	
n.a.	n.a.	n.a.	United Kingdom	
n.a.	n.a.	n.a.	ECE Central	
n.a.	n.a.	n.a.	Armenia	
n.a.	n.a.	n.a.	Azerbaijan	
0	0	0	Georgia	
n.a.	n.a.	n.a.	Israel	
n.a.	n.a.	n.a.	Kazakhstan	
n.a.	n.a.	n.a.	Kyrgyzstan	
n.a.	n.a.	n.a.	Tajikistan	
34	11	0	Turkey	
n.a.	n.a.	n.a.	Turkmenistan	
n.a.	n.a.	n.a.	Uzbekistan	
n.a.	n.a.	n.a.	ECE South-East	
n.a.	n.a.	n.a.	Canada	
n.a.	n.a.	n.a.	United States of America	
n.a.	n.a.	n.a.	ECE West	
n.a.	n.a.	n.a.	ECE Total	
n.a.	n.a.	n.a.	EU-28	

ANNEX 3: SOURCE DATA TABLES

Table 9a
Ownership and management

Country	Forest ownership					
	Private ownership (1,000 ha)			Public ownership (1,000 ha)		
	2000	2005	2010	2000	2005	2010
Belarus	0	0	0	8,273	8,436	8,436
Moldova	0	0	0	324	362	362
Russian Federation	0	1	1	809,269	808,790	815,136
Ukraine	7	7	16	9,544	9,568	8,786
ECE East	7	8	17	827,410	827,156	832,720
Albania	7	19	29	1,024	1,025	1,014
Andorra	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Austria	2,332	2,430	2,527	928	903	878
Belgium	377	374	364	290	299	317
Bosnia and Herzegovina	467	467	555	1,718	1,718	2,223
Bulgaria	334	401	451	3,041	3,250	3,286
Croatia	487	506	544	1,398	1,397	1,376
Cyprus	66	54	54	106	119	119
Czech Republic	n.a.	542	621	n.a.	2,105	2,037
Denmark	447	375	433	138	179	139
Estonia	953	978	1,038	899	894	923
Finland	15,245	15,303	15,474	7,213	6,859	6,744
France	11,322	11,799	12,360	3,967	4,062	4,064
Germany	4,945	5,465	5,477	5,993	5,919	5,932
Greece	811	845	845	2,790	2,907	2,907
Hungary	691	814	853	1,142	1,165	1,178
Iceland	16	22	28	13	14	14
Ireland	236	295	339	399	400	386
Italy	5,558	5,817	5,996	2,811	2,942	3,032
Latvia	1,464	1,513	1,594	1,749	1,781	1,755
Liechtenstein	1	1	1	6	6	6
Lithuania	458	717	837	1,562	1,404	1,333
Luxembourg	46	46	46	41	41	41
Malta	0	0	0	0	0	0
Monaco	0	0	0	0	0	0
Montenegro	381	381	433	245	245	394
Netherlands	181	183	192	178	182	181
Norway	n.a.	n.a.	9,642	n.a.	n.a.	1,488
Poland	1,524	1,590	1,686	7,535	7,610	7,643
Portugal	3,289	3,242	3,141	54	54	98
Romania	356	1,301	2,152	6,010	5,090	4,363
San Marino	0	0	0	0	0	0
Serbia	1,214	1,224	1,213	1,246	1,252	1,382
Slovakia	830	823	786	1,006	996	974
Slovenia	836	885	932	397	358	315
Spain	11,129	11,329	12,855	4,928	5,017	5,333
Sweden	n.a.	21,343	21,192	n.a.	6,875	6,822
Switzerland	875	888	898	319	329	337
The former Yugoslav Republic of Macedonia	94	94	94	864	881	881
United Kingdom	2,065	2,143	2,191	889	879	868
ECE Central	69,036	94,208	107,873	60,901	69,159	70,785
Armenia	0	0	0	304	283	283
Azerbaijan	0	0	0	936	936	936
Georgia	0	0	0	2,761	2,773	2,822
Israel	3	3	118	150	152	36
Kazakhstan	0	0	0	3,365	3,337	3,337
Kyrgyzstan	0	0	0	858	869	869
Tajikistan	0	0	0	360	360	360
Turkey	15	10	10	10,168	10,652	11,193
Turkmenistan	0	0	0	4,127	4,127	4,127
Uzbekistan	0	0	0	3,212	3,295	3,295
ECE South-East	18	13	128	26,241	26,784	27,259
Canada	28,486	28,467	28,445	317,859	317,652	317,402
United States of America	178,987	179,821	178,746	124,549	124,936	129,974
ECE West	207,473	208,288	207,191	442,408	442,588	447,376
ECE Total	276,534	302,517	315,209	1,356,960	1,365,686	1,378,139
EU-28	65,982	91,113	94,980	55,465	63,688	63,045

Data sources: FAO/FRA (2000, 2005, 2010). Joint FOREST EUROPE/UNECE/FAO pan-European reporting (2011, 2014), national contacts and sources, secretariat's estimates - for more detailed information about sources of data and methods of estimation see web-based version.

Forest ownership			Country
Other ownership/unknown ownership (1,000 ha)			
2000	2005	2010	
0	0	0	Belarus
0	0	0	Moldova
0	0	0	Russian Federation
0	0	0	Ukraine
0	0	0	ECE East
0	0	0	Albania
n.a.	n.a.	n.a.	Andorra
0	0	0	Austria
0	0	0	Belgium
0	0	0	Bosnia and Herzegovina
0	0	0	Bulgaria
0	0	0	Croatia
0	0	0	Cyprus
0	0	0	Czech Republic
0	7	7	Denmark
391	380	273	Estonia
0	0	0	Finland
0	0	0	France
416	0	0	Germany
0	0	0	Greece
75	2	2	Hungary
0	0	0	Iceland
0	0	0	Ireland
0	0	0	Italy
29	3	3	Latvia
0	0	0	Liechtenstein
0	0	0	Lithuania
0	0	0	Luxembourg
0	0	0	Malta
0	0	0	Monaco
626	626	827	Montenegro
0	0	0	Netherlands
n.a.	n.a.	972	Norway
0	0	0	Poland
0	0	0	Portugal
0	0	0	Romania
0	0	0	San Marino
0	0	0	Serbia
85	113	113	Slovakia
0	0	0	Slovenia
920	936	936	Spain
0	0	0	Sweden
0	0	0	Switzerland
0	0	0	The former Yugoslav Republic of Macedonia
0	0	0	United Kingdom
2,542	2,067	3,133	ECE Central
0	0	0	Armenia
0	0	0	Azerbaijan
0	0	0	Georgia
0	0	0	Israel
0	0	0	Kazakhstan
0	0	0	Kyrgyzstan
50	50	50	Tajikistan
0	0	0	Turkey
0	0	0	Turkmenistan
0	0	0	Uzbekistan
50	50	50	ECE South-East
1,457	1,457	1,455	Canada
0	0	n.a.	United States of America
1,457	1,457	1,455	ECE West
4,049	3,574	4,638	ECE Total
1,916	1,441	1,334	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 9b
Ownership and management

Country	Special designation and management categories					
	Forest under SFM (1,000 ha)			Forest with management plan and equivalents (1,000 ha) on forest area		
	2000	2005	2010	2000	2005	2010
Belarus	8,273	8,436	8,630	8,276	8,436	8,625
Moldova	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Russian Federation	597,586	599,544	596,488	809,269	808,790	809,090
Ukraine	8,296	8,697	8,900	9,510	9,575	9,548
ECE East	614,155	616,677	614,018	827,054	826,801	827,263
Albania	770	783	776	770	783	776
Andorra	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Austria	3,838	3,851	3,860	3,838	3,851	3,860
Belgium	n.a.	254	294	320	499	504
Bosnia and Herzegovina	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Bulgaria	3,156	3,542	3,927	3,375	3,651	3,737
Croatia	1,377	1,433	1,489	1,376	1,427	1,489
Cyprus	106	107	107	106	107	107
Czech Republic	2,637	2,647	2,657	2,637	2,647	2,657
Denmark	461	481	485	254	254	305
Estonia	2,243	2,252	2,217	1,230	1,543	1,651
Finland	22,459	22,157	22,157	14,946	14,497	14,497
France	6,589	6,611	6,925	6,480	6,348	7,354
Germany	11,076	11,076	11,076	7,528	7,528	7,528
Greece	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Hungary	1,907	1,983	2,029	1,907	1,983	2,046
Iceland	20	28	34	20	28	34
Ireland	635	695	739	475	504	526
Italy	8,369	8,759	9,149	8,198	8,198	8,198
Latvia	3,241	3,297	3,354	3,033	2,403	3,072
Liechtenstein	n.a.	n.a.	n.a.	7	7	7
Lithuania	2,020	2,121	2,160	2,020	2,121	2,170
Luxembourg	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Malta	n.a.	n.a.	n.a.	0	0	0
Monaco	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Montenegro	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Netherlands	69	136	161	360	365	370
Norway	n.a.	12,092	12,102	3,379	3,379	3,379
Poland	8,465	8,485	8,663	8,465	8,485	8,663
Portugal	1,544	1,457	1,465	1,081	1,081	1,081
Romania	6,366	6,391	6,515	5,984	6,008	5,653
San Marino	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Serbia	1,246	1,252	1,236	2,035	1,985	2,252
Slovakia	1,921	1,932	1,933	1,921	1,932	1,939
Slovenia	1,233	1,243	1,253	1,247	1,247	1,247
Spain	3,212	3,485	3,566	3,212	3,485	3,566
Sweden	27,389	28,203	28,203	28,163	28,218	27,000
Switzerland	1,154	1,177	1,200	0	726	0
The former Yugoslav Republic of Macedonia	881	897	918	881	897	918
United Kingdom	n.a.	n.a.	n.a.	1,152	1,411	1,521
ECE Central	124,384	138,827	140,650	116,400	117,597	118,107
Armenia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Azerbaijan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Georgia	n.a.	n.a.	n.a.	2,761	2,773	2,822
Israel	58	60	60	116	119	120
Kazakhstan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kyrgyzstan	796	840	850	796	840	850
Tajikistan	344	344	344	22	22	22
Turkey	656	2,907	6,303	10,183	10,662	11,203
Turkmenistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Uzbekistan	3,212	3,295	3,276	3,212	3,295	3,276
ECE South-East	5,066	7,446	10,833	17,089	17,711	18,293
Canada	285,587	285,587	285,587	206,035	206,035	206,035
United States of America	135,086	149,033	155,545	195,731	200,907	202,342
ECE West	420,673	434,620	441,132	401,766	406,942	408,377
ECE Total	1,164,277	1,197,570	1,206,633	1,362,310	1,369,050	1,372,040
EU-28	120,313	122,598	124,384	109,308	109,793	110,741

Data sources: FAO/FRA (2000, 2005, 2010). Joint FOREST EUROPE/UNECE/FAO pan-European reporting (2011, 2014), national contacts and sources, secretariat's estimates - for more detailed information about sources of data and methods of estimation see web-based version.

Special designation and management categories							Country
Forest with management plan (1,000 ha) on other wooded land			Forest within protected areas (1,000 ha)				
2000	2005	2010	2000	2005	2010		
n.a.	n.a.	n.a.	487	1,181	1,208	Belarus	
n.a.	n.a.	n.a.	44	61	64	Moldova	
n.a.	n.a.	n.a.	16,190	16,488	17,572	Russian Federation	
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Ukraine	
n.a.	n.a.	n.a.	16,721	17,730	18,844	ECE East	
n.a.	n.a.	n.a.	83	96	189	Albania	
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Andorra	
117	127	140	1,019	1,019	659	Austria	
11	12	13	n.a.	209	209	Belgium	
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Bosnia and Herzegovina	
0	0	0	245	279	572	Bulgaria	
212	353	499	39	47	54	Croatia	
n.a.	n.a.	n.a.	14	87	87	Cyprus	
700	736	734	700	741	740	Czech Republic	
n.a.	n.a.	n.a.	19	22	40	Denmark	
n.a.	n.a.	n.a.	141	185	213	Estonia	
n.a.	n.a.	n.a.	1,609	1,925	1,925	Finland	
n.a.	n.a.	n.a.	n.a.	n.a.	488	France	
n.a.	n.a.	n.a.	n.a.	2,754	2,754	Germany	
n.a.	n.a.	n.a.	152	159	164	Greece	
n.a.	n.a.	n.a.	175	419	424	Hungary	
1	2	3	0	0	0	Iceland	
0	0	0	n.a.	58	58	Ireland	
n.a.	1,167	1,167	2,874	3,062	3,265	Italy	
0	0	0	612	631	610	Latvia	
0	0	0	4	4	4	Liechtenstein	
0	73	84	395	424	433	Lithuania	
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Luxembourg	
n.a.	n.a.	n.a.	0	0	0	Malta	
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Monaco	
n.a.	n.a.	n.a.	13	13	13	Montenegro	
n.a.	n.a.	n.a.	80	83	83	Netherlands	
n.a.	n.a.	n.a.	158	277	428	Norway	
n.a.	n.a.	n.a.	183	186	187	Poland	
n.a.	n.a.	n.a.	681	697	700	Portugal	
n.a.	n.a.	n.a.	153	914	1,746	Romania	
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	San Marino	
n.a.	n.a.	n.a.	239	380	452	Serbia	
n.a.	n.a.	n.a.	845	889	1,104	Slovakia	
38	29	25	238	239	241	Slovenia	
n.a.	n.a.	n.a.	n.a.	3,200	3,495	Spain	
n.a.	n.a.	n.a.	1,286	1,360	1,435	Sweden	
0	0	0	n.a.	n.a.	58	Switzerland	
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	The former Yugoslav Republic of Macedonia	
n.a.	n.a.	n.a.	n.a.	n.a.	290	United Kingdom	
n.a.	n.a.	n.a.	11,957	20,360	23,120	ECE Central	
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Armenia	
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Azerbaijan	
n.a.	n.a.	n.a.	0	0	551	Georgia	
n.a.	n.a.	n.a.	27	28	28	Israel	
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Kazakhstan	
n.a.	n.a.	n.a.	38	59	80	Kyrgyzstan	
n.a.	n.a.	n.a.	44	44	44	Tajikistan	
10,679	10,587	10,334	542	584	602	Turkey	
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Turkmenistan	
n.a.	n.a.	n.a.	211	275	210	Uzbekistan	
n.a.	n.a.	n.a.	862	990	1,516	ECE South-East	
n.a.	n.a.	n.a.	23,924	23,924	23,924	Canada	
n.a.	n.a.	n.a.	22,995	28,189	33,384	United States of America	
n.a.	n.a.	n.a.	46,919	52,113	57,308	ECE West	
n.a.	n.a.	n.a.	76,460	91,193	100,788	ECE Total	
n.a.	n.a.	n.a.	11,460	19,590	21,976	EU-28	

ANNEX 3: SOURCE DATA TABLES

Table 10
Contribution of the forest sector to the GDP

Country	Contribution of the forestry sector (ISIC Rev,4 Divisions 02. 16 and 17) to total Gross Domestic Product in million USD at 2011 prices,		
	2000	2005	2011
Belarus	1,077	552	575
Moldova	32	36	29
Russian Federation	12,086	13,589	13,075
Ukraine	1,368	1,381	1,508
ECE East	14,563	15,558	15,187
Albania	55	39	83
Andorra	n.a.	n.a.	n.a.
Austria	7,342	6,878	7,143
Belgium	3,506	3,278	2,667
Bosnia and Herzegovina	244	244	254
Bulgaria	177	324	482
Croatia	645	725	782
Cyprus	144	150	111
Czech Republic	3,228	3,641	3,477
Denmark	2,522	2,242	1,511
Estonia	567	706	847
Finland	14,868	11,950	9,645
France	18,863	15,695	14,555
Germany	29,847	27,222	26,135
Greece	1,325	1,332	1,038
Hungary	1,163	1,026	1,005
Iceland	35	33	29
Ireland	1,203	1,203	744
Italy	19,169	16,845	15,011
Latvia	830	1,114	1,657
Liechtenstein	14	15	14
Lithuania	515	872	916
Luxembourg	155	153	139
Malta	18	19	15
Monaco	n.a.	n.a.	n.a.
Montenegro	56	19	18
Netherlands	4,313	4,016	3,535
Norway	4,714	3,976	2,434
Poland	4,872	5,224	7,070
Portugal	4,405	3,557	3,281
Romania	1,880	2,442	3,079
San Marino	n.a.	n.a.	n.a.
Serbia	492	361	401
Slovakia	1,400	1,483	2,046
Slovenia	804	798	788
Spain	12,886	11,896	9,596
Sweden	15,408	11,896	13,841
Switzerland	5,711	5,695	5,175
The former Yugoslav Republic of Macedonia	77	56	61
United Kingdom	13,056	12,399	9,488
ECE Central	176,509	159,524	149,073
Armenia	5	8	17
Azerbaijan	5	8	16
Georgia	27	85	61
Israel	653	620	741
Kazakhstan	76	103	173
Kyrgyzstan	5	8	9
Tajikistan	0	8	5
Turkey	3,085	3,501	5,632
Turkmenistan	1	1	1
Uzbekistan	17	44	14
ECE South-East	3,874	4,386	6,669
Canada	43,339	35,858	19,789
United States of America	135,498	117,134	95,664
ECE West	178,837	152,992	115,453
ECE Total	373,783	332,460	286,382

Data sources:FAO. 2014. Contribution of the forestry sector to national economies, 1990-2011, by A. Lebedys and Y. Li. Forest Finance Working Paper FSFM/ACC/09. FAO, Rome.

Contribution of the forestry sector (ISIC Rev,4 Divisions 02. 16 and 17) to total Gross Domestic Product. 1990-2011			Country
2000	2005	2011	
2.7	2.3	1.1	Belarus
0.9	0.8	0.5	Moldova
1.2	1	0.8	Russian Federation
1.6	1	1	Ukraine
1.28	1.02	0.82	ECE East
0.8	0.5	0.7	Albania
n,a,	n,a,	n,a,	Andorra
2.3	2	1.9	Austria
0.9	0.8	0.6	Belgium
2.4	1.9	1.6	Bosnia and Herzegovina
0.6	0.9	1	Bulgaria
1.6	1.4	1.5	Croatia
			Cyprus
2.3	2.2	1.8	Czech Republic
0.9	0.8	0.5	Denmark
4.4	3.9	4.3	Estonia
7.9	5.1	4.3	Finland
0.9	0.7	0.6	France
1	0.9	0.8	Germany
0.6	0.5	0.4	Greece
1.2	0.9	0.9	Hungary
0.4	0.3	0.2	Iceland
0.8	0.6	0.4	Ireland
1	0.8	0.8	Italy
4.9	4.5	6.5	Latvia
0.3	0.3	0.2	Liechtenstein
2.2	2.5	2.4	Lithuania
0.4	0.3	0.3	Luxembourg
0.3	0.3	0.2	Malta
n,a,	n,a,	n,a,	Monaco
2	0.7	0.5	Montenegro
0.7	0.6	0.5	Netherlands
1.3	1	0.6	Norway
1.6	1.5	1.6	Poland
2.3	1.8	1.6	Portugal
1.8	1.8	1.9	Romania
n,a,	n,a,	n,a,	San Marino
1.8	1.1	1.1	Serbia
2.7	2.3	2.4	Slovakia
2.4	2	1.8	Slovenia
1.2	1	0.7	Spain
4.2	2.8	2.9	Sweden
1.1	1	0.8	Switzerland
1.1	0.8	0.7	The former Yugoslav Republic of Macedonia
0.7	0.6	0.4	United Kingdom
1.2	1.0	0.9	ECE Central
0.1	0.1	0.2	Armenia
0	0	0	Azerbaijan
0.4	0.9	0.5	Georgia
0.4	0.4	0.3	Israel
0.1	0.1	0.1	Kazakhstan
0.1	0.2	0.2	Kyrgyzstan
0	0.2	0.1	Tajikistan
0.7	0.7	0.8	Turkey
0	0	0	Turkmenistan
0.1	0.2	0	Uzbekistan
0.5	0.5	0.6	ECE South-East
3.2	2.4	1.2	Canada
1	0.8	0.6	United States of America
1.2	1.0	0.7	ECE West
1.2	0.97	0.76	ECE Total

ANNEX 3: SOURCE DATA TABLES

Table 11
Employment in the forest sector

Country	Employment (1,000 FTE)					
	Forestry (ISIC/NACE o2)			Manufacture of wood and articles in wood (ISIC/NACE 2o)		
	2000	2005	2010	2000	2005	2010
Belarus	32.5	33.3	35.7	n.a.	n.a.	n.a.
Moldova	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Russian Federation	201.0	170.0	68.0	390.4	357.6	340.5
Ukraine	98.2	98.2	69.8	70.4	61.3	42.7
ECE East	331.7	301.5	173.5	460.8	418.9	383.2
Albania	0.4	0.2	0.2	n.a.	n.a.	n.a.
Andorra	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Austria	6.7	9.6	12.3	34.8	40.8	23.7
Belgium	2.4	1.7	2.8	18.2	25.6	24.5
Bosnia and Herzegovina	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Bulgaria	26.2	21.3	20.1	24.2	26.4	22.9
Croatia	12.4	12.4	13.5	17.4	17.4	19.5
Cyprus	0.7	0.8	1	2.8	3.1	2.8
Czech Republic	30.3	21.3	14.7	65	66	47.8
Denmark	2.3	2	1.8	17.8	13.2	11.1
Estonia	9.2	6.6	5.6	19.2	22.9	13.7
Finland	24.7	22.9	22.8	33.6	32.2	25.7
France	35.1	36.5	31.7	112.4	90.4	85.4
Germany	51.1	40.5	41.8	239.8	161.8	122.5
Greece	8.6	4.2	5.2	31.9	33.6	28.3
Hungary	18.1	15.7	16.3	39.3	37.5	23.5
Iceland	0.1	0.1	0.1	0.7	0.8	0.2
Ireland	2.9	2.3	2.4	8.1	7.8	7.7
Italy	42.5	43.3	44.9	181.8	172.9	153.9
Latvia	21.8	31.2	17.2	21.4	35	23.8
Liechtenstein	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Lithuania	11.8	9.6	11.9	24	35.7	32.3
Luxembourg	0.1	0.2	0.2	0.2	0.2	0.2
Malta	n.a.	n.a.	n.a.	0.3	0.2	0.2
Monaco	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Montenegro	0.4	0.4	0.4	0.3	0.2	0.2
Netherlands	1.5	1.5	1.6	21.8	19.3	19.9
Norway	5.5	4.1	3.7	15.2	16.6	13.1
Poland	58.3	58.3	63.7	180.7	180.7	175.6
Portugal	4	10.5	5.9	69.7	71	47
Romania	57.3	49.1	51	105.3	132.6	79.7
San Marino	0	0	0	0	0	0
Serbia	8.1	6.5	7.6	1.9	1.1	2.4
Slovakia	24.4	23.1	19.2	36.2	33.8	26.6
Slovenia	3.6	2.9	3.4	16.5	14.5	10.5
Spain	34.9	36.4	30.8	110.9	119.1	72.3
Sweden	19.5	22.4	28.1	40.5	37.8	34.9
Switzerland	3.7	5.8	8.4	42.3	38.5	39.9
The former Yugoslav Republic of Macedonia	4.5	4.5	4.2	2.7	2.7	2.8
United Kingdom	15.8	13.7	19.8	83.4	87.4	72
ECE Central	548.7	521.3	514.2	1620.3	1578.5	1266.5
Armenia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Azerbaijan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Georgia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Israel	3	1	1	n.a.	n.a.	n.a.
Kazakhstan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kyrgyzstan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Tajikistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Turkey	47.9	42.3	61.8	132.2	132.2	130.5
Turkmenistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Uzbekistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE South-East	50.9	43.3	62.8	132.2	132.2	130.5
Canada	86.5	69.6	52.0	165.3	169.2	112.2
United States of America	75.0	70.0	55.0	615.5	561.2	342.1
ECE West	161.5	139.6	107.0	780.7	730.4	454.4
ECE Total	1,092.8	1,005.7	857.5	2,994.0	2,860.1	2,234.5
EU-28	526.0	499.7	489.6	1557.2	1518.7	1207.9

Data sources: FAO/FRA (2000, 2005, 2010). Joint FOREST EUROPE/UNECE/FAO pan-European reporting (2011, 2014), national contacts and sources, secretariat's estimates - for more detailed information about sources of data and methods of estimation see web-based version.

Employment (1,000 FTE)			Country
Manufacture of paper and paper products (ISIC/NACE 21)			
2000	2005	2010	
n.a.	n.a.	n.a.	Belarus
n.a.	n.a.	n.a.	Moldova
415	393.1	398.9	Russian Federation
29.8	28.8	40.7	Ukraine
444.8	421.9	439.6	ECE East
n.a.	n.a.	n.a.	Albania
n.a.	n.a.	n.a.	Andorra
19.7	17.9	17.8	Austria
17.9	15.9	15.6	Belgium
n.a.	n.a.	n.a.	Bosnia and Herzegovina
12.4	11.2	11.1	Bulgaria
5.3	5.3	5.1	Croatia
0.5	0.5	0.7	Cyprus
24.6	25.8	23.7	Czech Republic
7.4	7.7	6	Denmark
2	1.7	1.1	Estonia
40.4	35.8	20.9	Finland
105.7	83.2	67.6	France
151.7	147.6	146.4	Germany
8.9	8.3	9.2	Greece
11.6	13.8	13.6	Hungary
0	0	0	Iceland
3.8	2.9	2.2	Ireland
101.5	89.9	88.8	Italy
1.6	1.3	1.4	Latvia
n.a.	n.a.	n.a.	Liechtenstein
3.6	2.5	2.5	Lithuania
0	0	0	Luxembourg
0.5	0.2	0.3	Malta
n.a.	n.a.	n.a.	Monaco
0.2	0.2	0.3	Montenegro
27.5	24.7	17.4	Netherlands
11.4	7.2	5.8	Norway
47.5	47.5	53.4	Poland
12.5	14.9	10.6	Portugal
25.7	19.1	12.3	Romania
0	0	0	San Marino
n.a.	n.a.	n.a.	Serbia
13.8	9.2	8.8	Slovakia
6.9	8.3	4.5	Slovenia
50.3	48	44	Spain
41.8	36	31.7	Sweden
12.1	12.1	9.3	Switzerland
1.3	1.3	1.5	The former Yugoslav Republic of Macedonia
112.6	93	62.2	United Kingdom
882.7	792.9	695.8	ECE Central
n.a.	n.a.	n.a.	Armenia
n.a.	n.a.	n.a.	Azerbaijan
n.a.	n.a.	n.a.	Georgia
n.a.	n.a.	n.a.	Israel
n.a.	n.a.	n.a.	Kazakhstan
n.a.	n.a.	n.a.	Kyrgyzstan
n.a.	n.a.	n.a.	Tajikistan
42.5	42.5	44.1	Turkey
n.a.	n.a.	n.a.	Turkmenistan
n.a.	n.a.	n.a.	Uzbekistan
42.5	42.5	44.1	ECE South-East
115.7	101.2	74.0	Canada
604.8	484.2	394.6	United States of America
720.5	585.4	468.5	ECE West
2,090.4	1,842.7	1,648.1	ECE Total
857.7	772.2	678.9	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 12a
Trade in wood

Country	Export							
	Paper and paperboard (total, tonnes)				Paper and paperboard (total,1000 USD)			
	2000	2005	2010	2013	2000	2005	2010	2013
Belarus	71,100	85,500	222,370	130,769	35,082	30,352	176,709	77,847
Moldova	7,873	7,873	5,700	5,429	3,645	3,645	11,772	3,780
Russian Federation	2,253,300	2,737,000	2,408,708	2,563,480	835,827	1,345,144	1,430,546	1,704,765
Ukraine	62,712	145,990	197,851	241,790	29,173	194,544	297,238	350,566
ECE East	2,394,985	2,976,363	2,834,629	2,941,468	903,727	1,573,685	1,916,265	2,136,958
Albania	1,094	1,094	1,094	2,700	810	810	810	2,037
Andorra	45	45	45	45	33	33	33	33
Austria	3,450,000	3,922,000	4,072,202	4,029,346	2,302,593	3,030,679	3,399,841	3,450,975
Belgium	2,301,000	3,123,000	3,550,510	2,431,270	1,900,808	2,629,113	2,946,034	1,958,062
Bosnia and Herzegovina	3,200	41,825	90,624	105,000	1,085	23,001	81,915	97,168
Bulgaria	54,997	139,681	77,086	161,150	26,703	77,939	72,702	159,617
Croatia	180,000	131,000	141,330	149,600	86,314	57,433	95,484	81,748
Cyprus	1,026	21	291	232	415	66	479	335
Czech Republic	536,000	828,000	786,200	660,000	309,431	619,049	712,040	791,631
Denmark	239,270	307,525	233,427	127,898	183,140	234,735	270,058	120,749
Estonia	52,550	80,030	103,912	102,017	27,334	50,849	96,492	103,413
Finland	11,641,844	11,155,096	10,820,073	9,862,838	7,899,820	8,458,905	9,228,890	9,136,948
France	4,742,672	5,590,369	4,664,061	4,211,674	4,028,291	5,043,072	4,875,013	4,517,615
Germany	8,905,000	12,579,000	13,916,386	13,070,000	7,961,218	11,452,131	13,360,814	13,343,870
Greece	62,428	71,868	66,870	87,352	46,232	57,710	57,856	73,284
Hungary	229,700	420,719	609,853	653,668	138,489	351,268	531,151	598,764
Iceland	2,000	335	40	8	232	155	31	8
Ireland	60,700	42,860	32,870	80,916	73,060	75,895	58,942	78,731
Italy	2,241,000	2,749,816	3,069,812	3,251,982	1,999,827	2,726,203	3,282,501	3,645,613
Latvia	9,180	62,905	36,925	33,698	5,876	58,339	36,194	42,159
Liechtenstein	87,140	87,140	87,140	87,140	n.a.	n.a.	n.a.	n.a.
Lithuania	37,100	123,233	123,233	111,704	17,893	40,048	99,974	115,509
Luxembourg	67,089	40,408	9,207	8,370	178,201	101,153	22,520	20,268
Malta	18	18	32	219	26	26	349	2,293
Monaco	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Montenegro	353	353	353	140	376	376	376	273
Netherlands	3,001,000	3,150,700	2,270,100	1,939,999	2,233,557	2,687,358	2,583,866	2,395,421
Norway	1,981,415	1,911,090	1,454,761	984,056	1,097,060	1,267,381	1,015,325	685,671
Poland	754,100	1,407,300	1,943,792	2,159,765	472,012	1,091,025	1,702,020	2,128,550
Portugal	744,414	1,227,548	1,168,572	1,847,464	530,888	1,019,862	1,081,694	1,833,920
Romania	115,100	130,245	93,802	118,040	47,809	74,513	93,390	144,970
San Marino								
Serbia	13,000	66,000	108,000	163,605	7,240	73,298	140,196	198,064
Slovakia	349,000	709,000	740,187	540,382	209,795	535,974	1,156,742	523,094
Slovenia	422,310	566,990	573,028	566,969	273,734	413,019	478,720	483,191
Spain	1,478,965	2,249,000	2,952,012	2,907,712	1,275,171	1,618,255	1,805,933	2,704,238
Sweden	9,031,446	10,535,969	10,107,429	10,132,365	5,915,159	8,144,211	9,104,209	9,656,265
Switzerland	1,182,900	1,363,340	911,863	868,983	987,474	1,403,217	1,055,433	895,720
The former Yugoslav Republic of Macedonia	6,932	7,102	12,051	2,437	3,440	2,545	5,693	2,515
United Kingdom	1,759,000	1,164,000	926,227	1,093,000	1,859,503	1,823,038	1,650,894	1,591,066
ECE Central	55,744,988	65,986,625	65,755,400	62,553,744	42,101,049	55,242,684	61,104,614	61,583,788
Armenia	240	10	25	131	248	18	109	221
Azerbaijan	121	1,839	500	3,000	218	1,159	242	1,548
Georgia	294	294	1	n.a.	345	345	3	n.a.
Israel	34,571	21,926	92,711	122,490	25,145	28,996	51,591	68,219
Kazakhstan	373	15,565	7,649	7,608	191	13,071	12,749	6,693
Kyrgyzstan	792	792	374	21	16	185	71	35
Tajikistan	100	100	100	100	72	72	72	72
Turkey	65,000	174,627	274,528	369,857	47,435	99,756	234,154	433,587
Turkmenistan	25	25	25	25	20	20	20	20
Uzbekistan	1,387	4,629	5,547	5,364	750	2,267	2,793	4,647
ECE South-East	102,903	219,807	381,460	508,596	74,440	145,889	301,804	515,042
Canada	15,612,761	15,484,000	9,464,000	8,366,000	9,777,071	10,360,778	7,047,802	6,572,998
United States of America	9,139,000	9,609,997	10,299,543	12,083,500	6,871,758	7,297,611	8,511,763	10,141,737
ECE West	24,751,761	25,093,997	19,763,543	20,449,500	16,648,829	17,658,389	15,559,565	16,714,735
ECE Total	82,994,637	94,276,792	88,735,032	86,453,308	59,728,045	74,620,647	78,882,248	80,950,523
EU-28	52,466,909	62,508,301	63,089,429	60,339,630	40,003,299	52,471,868	58,804,802	59,702,299

Data sources: FAOSTAT 2015.

Export								
Roundwood (total, m3)				Roundwood (total, 1000 USD)				Country
2000	2005	2010	2013	2000	2005	2010	2013	
945,000	1,517,550	2,221,923	2,699,649	21,079	35,677	101,487	110,602	Belarus
300	300	2,548	56	9	9	605	23	Moldova
32,049,000	48,300,000	21,175,826	18,182,412	1,356,630	2,858,830	1,858,940	1,654,234	Russian Federation
704,969	2,670,147	3,670,600	4,518,460	32,804	146,281	219,526	296,778	Ukraine
33,699,269	52,487,997	27,070,897	25,400,577	1,410,522	3,040,797	2,180,558	2,061,637	ECE East
379	56,767	56,767	78,900	578	1,194	1,194	3,830	Albania
112	112	112	112	10	10	10	10	Andorra
942,000	901,000	1,030,625	840,912	69,432	84,249	111,999	99,582	Austria
1,181,000	1,113,000	872,479	1,285,230	93,977	93,650	119,808	184,017	Belgium
445,510	445,510	706,100	825,000	6,809	20,638	43,772	60,289	Bosnia and Herzegovina
360,000	556,310	679,366	679,447	9,692	23,669	40,476	46,915	Bulgaria
586,000	548,000	825,000	972,000	25,606	47,367	77,381	75,750	Croatia
4	4	4	4	1	1	1	1	Cyprus
2,030,000	3,216,000	4,144,000	4,464,000	94,054	191,615	311,099	460,977	Czech Republic
877,000	681,479	785,487	706,094	69,265	47,134	62,269	65,702	Denmark
4,431,960	1,923,766	2,453,141	3,080,206	136,189	102,088	158,530	207,108	Estonia
533,276	753,555	501,939	885,397	43,326	64,778	58,115	85,014	Finland
5,859,116	4,325,471	7,478,314	5,463,427	399,799	278,834	426,673	368,503	France
5,604,000	6,889,000	3,858,698	3,345,491	405,875	507,188	388,372	357,294	Germany
9,845	16,026	35,690	17,183	728	1,100	3,269	2,983	Greece
1,593,400	1,117,000	1,119,116	1,394,100	59,545	71,291	81,816	90,727	Hungary
10	10	10	18	1	1	1	1	Iceland
42,000	337,917	349,980	357,653	8,348	13,181	49,217	51,519	Ireland
24,380	15,113	47,540	199,469	3,349	6,819	12,797	29,139	Italy
4,353,250	4,265,630	5,486,875	4,054,624	121,881	195,287	327,796	274,709	Latvia
6,000	6,000	6,000	6,000	463	463	463	463	Liechtenstein
1,202,850	1,173,919	1,441,955	2,044,876	40,464	60,286	103,654	183,704	Lithuania
228,350	350,056	102,164	412,320	11,371	18,082	33,736	34,460	Luxembourg
0	0	0	10	0	0	0	1	Malta
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Monaco
21,080	21,080	21,080	47,390	1,585	1,585	1,585	3,534	Montenegro
242,000	487,400	509,100	468,000	9,425	24,578	40,495	38,187	Netherlands
514,400	524,789	883,857	2,646,989	20,548	28,660	63,062	194,761	Norway
347,200	603,800	1,733,535	2,898,348	23,656	46,661	157,579	261,823	Poland
570,103	1,279,000	1,002,960	1,324,329	28,147	86,192	94,893	145,499	Portugal
535,100	159,000	429,273	807,954	48,503	17,385	40,644	90,607	Romania
								San Marino
47,600	57,000	36,000	57,223	5,112	7,682	6,558	7,396	Serbia
1,612,000	1,815,000	2,563,703	3,045,375	56,842	96,011	248,500	198,123	Slovakia
303,980	422,584	844,016	1,507,671	12,183	32,976	75,720	143,117	Slovenia
369,001	15,726	67,138	2,586,193	13,622	19,565	89,004	223,284	Spain
1,461,813	3,126,887	1,256,041	933,406	61,146	176,911	112,665	124,478	Sweden
3,754,410	1,454,807	820,302	749,997	161,727	117,982	88,361	84,037	Switzerland
1,184	36,063	1,347	6,616	194	984	424	668	The former Yugoslav Republic of Macedonia
271,019	895,478	621,760	1,059,921	23,240	47,769	39,598	65,650	United Kingdom
40,361,332	39,590,259	42,771,474	49,251,885	2,066,693	2,533,866	3,471,536	4,263,862	ECE Central
1,500	1,500	15	15	244	222	15	15	Armenia
1,600	0	10	10	171	1	1	1	Azerbaijan
39,000	6,000	0	n.a.	3,065	495	0	n.a.	Georgia
56	5	592	810	5	1	51	71	Israel
559,000	60	83	83	30,291	74	5	5	Kazakhstan
291	291	159	159	1	181	11	11	Kyrgyzstan
0	0	0	0	n.a.	n.a.	n.a.	n.a.	Tajikistan
4,000	9,693	7,412	11,300	1,217	2,818	1,948	3,730	Turkey
0	0	0	0	46	46	46	46	Turkmenistan
1,160	2,313	4,124	54	116	90	424	5	Uzbekistan
606,607	19,862	12,395	12,431	35,156	3,928	2,501	3,884	ECE South-East
3,048,104	5,932,499	4,069,069	7,071,000	313,203	521,858	401,140	815,151	Canada
12,156,600	9,937,704	9,898,069	16,838,900	1,448,989	1,458,585	1,858,906	3,088,396	United States of America
15,204,704	15,870,203	13,967,138	23,909,900	1,762,192	1,980,443	2,260,046	3,903,547	ECE West
89,871,912	107,968,321	83,821,904	98,574,793	5,274,563	7,559,034	7,914,641	10,232,930	ECE Total
35,570,647	36,988,121	40,239,899	44,833,640	1,869,666	2,354,667	3,266,106	3,908,873	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 12b
Trade in wood

Country	Export							
	Sawnwood (total, m³)				Sawnwood (total, 1,000 USD)			
	2000	2005	2010	2013	2000	2005	2010	2013
Belarus	711,400	1,196,900	467,655	852,000	65,601	120,717	63,541	125,207
Moldova	16	16	4,000	1,379	2	2	1,490	481
Russian Federation	7,764,000	14,778,000	17,689,994	20,961,953	733,100	1,936,200	3,023,161	3,626,108
Ukraine	349,000	1,306,400	1,375,800	1,455,902	52,539	230,743	229,360	273,021
ECE East	8,824,416	17,281,316	19,537,449	23,271,234	851,242	2,287,662	3,317,552	4,024,817
Albania	9,050	21,409	21,409	6,550	3,156	4,304	4,304	1,952
Andorra	195	195	195	195	29	29	29	29
Austria	6,356,000	7,281,000	6,123,364	5,029,359	1,045,281	1,485,858	1,553,522	1,439,954
Belgium	1,025,000	1,425,000	1,945,702	1,339,690	320,250	417,131	464,168	531,357
Bosnia and Herzegovina	226,460	931,727	674,390	743,000	57,172	141,483	142,233	166,246
Bulgaria	265,000	524,000	238,339	377,530	31,726	36,043	36,404	68,165
Croatia	532,650	405,000	555,000	693,000	112,780	152,047	206,415	255,333
Cyprus	1,350	210	5	5	400	101	4	4
Czech Republic	1,778,000	1,758,000	3,410,700	1,730,000	212,367	329,175	409,315	419,761
Denmark	117,000	143,410	454,476	299,483	56,255	54,869	70,521	51,934
Estonia	1,069,650	1,137,360	753,749	804,542	144,586	243,608	239,119	263,958
Finland	8,430,945	7,663,408	5,838,119	7,152,608	1,434,414	1,616,426	1,557,484	1,892,161
France	1,385,591	1,468,720	1,009,760	1,054,566	297,445	387,144	314,956	301,258
Germany	3,911,000	7,391,000	7,268,412	6,745,470	840,613	1,823,339	1,924,147	1,932,278
Greece	11,347	13,111	10,700	19,020	4,483	6,777	4,648	5,318
Hungary	305,100	187,000	210,140	257,059	68,337	67,529	70,787	89,247
Iceland	70	70	965	91	119	119	558	26
Ireland	174,000	447,078	620,617	601,667	33,261	68,032	84,819	108,211
Italy	208,000	160,898	264,000	260,988	135,633	125,953	178,182	184,933
Latvia	3,077,330	2,835,462	2,148,711	2,523,675	403,175	558,752	520,310	640,890
Liechtenstein	n.a.	n.a.	0	0	n.a.	n.a.	n.a.	n.a.
Lithuania	823,040	912,547	555,388	634,247	108,279	200,994	137,370	164,498
Luxembourg	33,101	54,966	65,621	67,740	5,944	11,210	13,958	15,414
Malta	13	13	13	13	2	2	2	2
Monaco	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Montenegro	51,681	51,681	51,681	91,240	14,556	14,556	14,556	14,079
Netherlands	380,000	487,900	314,100	404,000	130,062	199,174	180,115	193,475
Norway	656,270	442,081	487,730	515,575	103,011	94,437	117,270	137,176
Poland	1,100,300	655,900	508,584	572,235	179,021	176,536	177,386	201,922
Portugal	283,377	375,000	296,147	618,967	41,666	74,087	75,814	79,662
Romania	2,322,400	2,310,000	2,895,944	3,336,634	364,334	506,485	698,512	940,209
San Marino	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Serbia	198,000	171,000	114,000	136,000	37,160	43,517	34,070	44,550
Slovakia	920,000	762,000	895,999	579,563	117,823	185,458	252,070	233,777
Slovenia	343,880	428,825	1,091,432	1,105,853	57,072	81,650	243,341	283,567
Spain	128,290	96,000	150,843	153,337	48,082	39,859	50,319	56,429
Sweden	11,048,000	11,898,000	11,371,077	11,637,170	2,113,348	2,847,084	3,312,668	3,364,897
Switzerland	192,770	220,012	465,996	194,238	34,918	45,248	104,785	490,850
The former Yugoslav Republic of Macedonia	19,195	1,728	5,873	4,517	4,322	458	1,803	1,486
United Kingdom	194,735	358,000	194,624	164,411	46,534	94,321	72,602	56,835
ECE Central	47,578,790	53,019,711	51,013,805	49,854,238	8,607,616	12,133,795	13,268,566	14,140,993
Armenia	2,880	4,400	6,025	148	354	588	380	259
Azerbaijan	5,656	1,542	749	1,000	588	257	649	1,318
Georgia	37,700	195,900	51,286	n.a.	3,318	13,855	20,708	n.a.
Israel	101	332	233	340	54	184	109	107
Kazakhstan	357,265	126,560	508	176	9,772	4,294	182	3
Kyrgyzstan	1,780	282	1,300	1,300	522	145	613	613
Tajikistan	29	29	29	29	8	8	8	8
Turkey	43,000	122,010	40,820	27,700	10,813	14,310	14,896	14,027
Turkmenistan	44	44	44	44	5	5	5	5
Uzbekistan	212	1,470	52	10,284	26	120	4	5,525
ECE South-East	448,667	452,569	101,046	41,021	25,460	33,766	37,554	21,865
Canada	36,455,979	41,184,912	22,375,147	28,417,930	8,205,679	8,708,489	4,900,872	7,432,519
United States of America	5,128,900	4,379,706	4,959,766	7,764,000	2,180,578	1,964,004	2,223,839	3,056,689
ECE West	41,584,879	45,564,618	27,334,913	36,181,930	10,386,257	10,672,493	7,124,711	10,489,208
ECE Total	98,436,752	116,318,214	97,987,213	109,348,423	19,870,575	25,127,716	23,748,383	28,676,883
EU-28	46,225,099	51,179,808	49,191,566	48,162,832	8,353,173	11,789,644	12,848,958	13,775,449

Data sources: FAOSTAT 2015.

Export								Country
Wood-based panels (total, m³)				Wood-based panels (total, 1,000 USD)				
2000	2005	2010	2013	2000	2005	2010	2013	
363,200	359,300	370,673	760,220	50,674	71,143	104,644	222,284	Belarus
321	321	280	5,336	55	55	48	2,126	Moldova
1,404,000	2,181,000	2,630,653	2,703,960	266,770	696,077	948,546	1,298,591	Russian Federation
49,356	326,887	558,732	830,200	12,522	99,111	186,240	286,923	Ukraine
1,816,877	2,867,508	3,560,338	4,299,716	330,021	866,386	1,239,478	1,809,924	ECE East
1,449	1,200	1,200	1,200	610	295	295	295	Albania
25	25	25	25	7	7	7	7	Andorra
2,031,000	2,747,000	2,756,469	2,859,763	633,455	1,155,630	1,395,176	1,517,535	Austria
2,759,000	2,584,820	2,039,466	1,770,748	681,691	1,034,476	1,067,319	992,184	Belgium
15,302	25,458	17,540	22,000	201	15,457	14,939	18,439	Bosnia and Herzegovina
181,912	529,363	554,152	542,766	34,856	93,796	133,414	150,533	Bulgaria
39,006	71,000	115,033	122,000	37,195	68,005	67,405	67,922	Croatia
163	166	193	27	50	85	232	20	Cyprus
639,000	777,300	1,435,977	1,593,400	109,025	252,020	361,838	465,410	Czech Republic
144,000	115,850	125,245	153,671	62,821	73,889	47,439	46,585	Denmark
436,290	312,751	276,595	359,981	51,487	108,413	139,933	166,298	Estonia
1,381,000	1,556,006	1,016,598	1,036,823	598,262	876,279	613,606	698,366	Finland
2,269,327	3,504,972	2,468,297	2,936,252	692,942	1,083,687	901,746	1,019,816	France
4,620,000	7,645,000	6,185,185	5,707,471	1,614,883	3,136,687	3,254,273	3,085,451	Germany
90,566	199,889	71,200	180,562	20,322	59,631	33,696	48,841	Greece
306,100	487,420	569,706	405,642	69,840	156,385	192,930	185,087	Hungary
38	38	71	4	172	172	68	3	Iceland
580,000	769,423	659,720	665,022	113,957	292,740	237,323	264,898	Ireland
1,121,000	872,409	1,076,200	913,236	390,542	548,563	612,645	605,448	Italy
232,890	359,727	807,652	990,435	80,296	161,455	308,766	408,036	Latvia
n.a.	n.a.	0	n.a.	n.a.	n.a.	n.a.	n.a.	Liechtenstein
211,060	170,966	311,223	363,405	28,684	51,715	72,345	104,360	Lithuania
166,689	384,827	510,323	409,148	38,887	81,410	188,644	174,336	Luxembourg
140	140	38	1,551	34	34	19	20	Malta
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Monaco
702	702	702	300	268	268	268	111	Montenegro
275,000	327,200	273,700	314,000	89,273	134,987	140,099	156,171	Netherlands
340,773	253,663	242,621	185,771	73,958	98,244	96,104	86,996	Norway
1,336,700	2,382,300	2,149,529	2,482,554	302,613	763,923	769,011	935,014	Poland
747,514	914,000	528,317	938,712	152,974	263,918	175,177	263,984	Portugal
153,200	704,000	1,771,602	2,895,785	35,444	244,315	707,631	873,033	Romania
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	San Marino
18,000	27,000	100,060	151,000	4,500	11,978	23,103	42,666	Serbia
240,000	329,000	455,000	300,814	41,279	166,105	184,353	119,557	Slovakia
186,230	252,012	314,833	234,157	57,646	134,732	150,791	139,042	Slovenia
1,048,409	1,479,000	2,018,912	1,843,550	292,236	533,791	516,361	753,575	Spain
265,084	191,000	222,604	197,505	113,117	80,872	202,410	183,612	Sweden
674,130	833,001	718,478	676,549	217,043	306,928	303,680	326,176	Switzerland
584	1,685	3,186	2,108	192	877	1,774	739	The former Yugoslav Republic of Macedonia
345,285	520,060	509,423	431,729	115,992	186,454	175,185	171,099	United Kingdom
22,857,568	31,330,373	30,307,075	31,689,666	6,756,754	12,178,223	13,090,005	14,071,665	ECE Central
88	140	104	3	39	41	50	2	Armenia
108	1,729	100	0	8	364	102	19	Azerbaijan
441	441	3,133	n.a.	181	181	784	n.a.	Georgia
8,707	507	5,094	2,720	8,105	309	1,440	1,188	Israel
701	929	1,126	6,970	58	96	973	5,485	Kazakhstan
200	6	200	200	20	3	198	198	Kyrgyzstan
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Tajikistan
64,000	513,186	935,885	888,600	21,428	138,634	353,963	400,412	Turkey
939	939	939	939	430	430	430	430	Turkmenistan
392	3,419	3,086	236	7	145	1,205	246	Uzbekistan
75,576	521,296	949,667	899,668	30,276	140,203	359,145	407,980	ECE South-East
10,834,494	13,467,000	4,115,814	6,113,061	2,525,865	4,299,677	1,477,974	2,164,198	Canada
2,838,000	2,081,612	1,838,753	2,600,551	1,007,800	1,007,220	936,318	1,213,553	United States of America
13,672,494	15,548,612	5,954,567	8,713,612	3,533,665	5,306,897	2,414,292	3,377,751	ECE West
38,422,515	50,267,789	40,771,647	45,602,662	10,650,716	18,491,709	17,102,920	19,667,320	ECE Total
21,806,565	30,187,601	29,223,192	30,650,709	6,459,803	11,743,997	12,649,767	13,596,233	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 12c
Trade in wood

Country	Export Wood pulp (tonnes)			
	2000	2005	2010	2013
Belarus	100	100	119	119
Moldova	642	642	0	0
Russian Federation	1,648,500	1,946,000	1,869,532	2,211,969
Ukraine	301	69	69	69
ECE East	1,649,543	1,946,811	1,869,720	2,212,157
Albania	16	16	16	25
Andorra	n.a.	n.a.	n.a.	n.a.
Austria	332,000	234,002	353,240	446,458
Belgium	719,000	726,183	1,112,541	816,100
Bosnia and Herzegovina	44	74	74	74
Bulgaria	59,850	59,850	95,602	107,180
Croatia	50,000	43,000	43,001	29,000
Cyprus	90	4	4	0
Czech Republic	289,000	357,580	386,008	143,488
Denmark	1,400	343	16,751	12,622
Estonia	120	132,832	132,832	138,016
Finland	1,681,249	2,036,796	2,158,736	3,073,492
France	392,195	464,536	581,920	481,837
Germany	392,000	824,000	957,493	1,255,000
Greece	1,024	4,978	840	10,756
Hungary	3,400	31	31	4,333
Iceland	0	0	0	0
Ireland	1,000	1,636	578	168
Italy	22,255	34,477	28,284	35,665
Latvia	11	11	34	98
Liechtenstein	n.a.	n.a.	0	n.a.
Lithuania	6,323	240	14,650	31,903
Luxembourg	2	2	2	0
Malta	0	0	0	0
Monaco	n.a.	n.a.	n.a.	n.a.
Montenegro	0	0	0	n.a.
Netherlands	363,000	498,900	712,600	943,802
Norway	551,000	669,860	579,870	462,201
Poland	32,600	42,020	30,239	81,205
Portugal	969,099	762,000	830,923	1,167,821
Romania	31,200	15,000	1,280	124
San Marino	n.a.	n.a.	n.a.	n.a.
Serbia	31	1	1	0
Slovakia	75,000	105,000	161,636	182,654
Slovenia	35,380	44,804	26	1,346
Spain	809,494	939,297	889,765	1,183,599
Sweden	3,072,797	3,535,000	3,242,725	3,434,784
Switzerland	135,360	111,687	10,558	714
The former Yugoslav Republic of Macedonia	35	35	35	4
United Kingdom	8,468	4,905	31,000	11,063
ECE Central	10,034,443	11,649,100	12,373,295	14,055,532
Armenia	4	4	4	4
Azerbaijan	0	0	0	0
Georgia	297	297	297	126
Israel	126	126	126	200
Kazakhstan	200	200	200	0
Kyrgyzstan	0	0	0	0
Tajikistan	n.a.	n.a.	n.a.	n.a.
Turkey	1,102	1,102	1,091	31,142
Turkmenistan	n.a.	n.a.	n.a.	n.a.
Uzbekistan	0	0	0	1,890
ECE South-East	1,729	1,729	1,718	33,362
Canada	11,879,443	10,611,000	9,305,000	9,822,000
United States of America	5,816,000	5,817,483	7,884,442	7,851,600
ECE West	17,695,443	16,428,483	17,189,442	17,673,600
ECE Total	29,381,158	30,026,123	31,434,175	33,974,651
EU-28	9,347,957	10,867,427	11,782,741	13,592,514

Data sources: FAOSTAT 2015.

Export Wood pulp (total, 1,000 USD)				Country
2000	2005	2010	2013	
70	3	4	4	Belarus
331	331	1	1	Moldova
580,542	756,073	1,113,106	1,106,815	Russian Federation
30	59	59	9	Ukraine
580,973	756,466	1,113,170	1,106,829	ECE East
2	2	2	19	Albania
n.a.	n.a.	n.a.	n.a.	Andorra
200,743	130,549	289,643	335,373	Austria
442,883	393,578	756,332	569,181	Belgium
54	54	54	54	Bosnia and Herzegovina
24,946	24,944	69,836	63,580	Bulgaria
11,313	13,330	16,293	11,687	Croatia
84	9	9	9	Cyprus
163,797	174,154	281,465	87,378	Czech Republic
620	233	8,217	5,854	Denmark
63	88,504	88,504	84,290	Estonia
969,733	1,025,919	1,626,725	2,070,927	Finland
235,314	243,149	385,247	431,315	France
290,714	448,635	745,959	889,131	Germany
587	2,654	805	4,935	Greece
1,583	24	24	3,655	Hungary
0	0	0	0	Iceland
1,693	331	245	30	Ireland
13,591	15,595	21,830	24,054	Italy
2	18	31	121	Latvia
n.a.	n.a.	n.a.	n.a.	Liechtenstein
3,918	126	11,268	22,707	Lithuania
1	2	2		Luxembourg
0	0	0	0	Malta
n.a.	n.a.	n.a.	n.a.	Monaco
0	0	0	n.a.	Montenegro
215,266	316,021	533,900	775,312	Netherlands
306,814	373,446	488,876	434,922	Norway
19,346	20,917	24,021	53,610	Poland
539,246	387,175	446,719	645,827	Portugal
16,634	6,075	1,057	78	Romania
n.a.	n.a.	n.a.	n.a.	San Marino
14,100	236	3	0	Serbia
39,012	49,742	120,670	111,416	Slovakia
20,442	21,639	26	955	Slovenia
451,127	424,627	596,329	933,581	Spain
1,883,997	1,890,017	2,629,439	2,587,840	Sweden
76,480	85,834	4,995	755	Switzerland
60	60	60	5	The former Yugoslav Republic of Macedonia
5,097	2,741	23,825	7,726	United Kingdom
5,949,262	6,140,340	9,172,411	10,156,327	ECE Central
0	0	1	1	Armenia
0	0	0	0	Azerbaijan
164	164	164		Georgia
63	63	63	63	Israel
57	57	57	57	Kazakhstan
0	0	0	0	Kyrgyzstan
n.a.	n.a.	n.a.	n.a.	Tajikistan
353	229	1,281	22,035	Turkey
n.a.	n.a.	n.a.	n.a.	Turkmenistan
0	0	0	1,307	Uzbekistan
637	513	1,566	23,463	ECE South-East
6,646,766	5,216,524	6,804,448	6,545,579	Canada
3,256,021	3,197,866	5,365,916	5,671,572	United States of America
9,902,787	8,414,390	12,170,364	12,217,151	ECE West
16,433,659	15,311,709	22,457,511	23,503,770	ECE Total
5,551,752	5,680,708	8,678,421	9,720,572	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 12d
Trade in wood

Country	Import							
	Paper and paperboard (total, tonnes)				Paper and paperboard (total, 1,000 USD)			
	2000	2005	2010	2013	2000	2005	2010	2013
Belarus	144,000	140,500	284,312	104,400	111,300	118,332	438,926	117,682
Moldova	26,742	26,742	55,101	34,686	20,683	20,683	75,582	35,770
Russian Federation	357,900	1,065,000	1,324,182	1,504,548	253,345	1,097,343	1,844,173	2,040,615
Ukraine	244,022	689,780	837,243	647,700	157,886	557,429	879,169	758,368
ECE East	772,664	1,922,022	2,500,838	2,291,334	543,214	1,793,787	3,237,850	2,952,435
Albania	18,019	18,019	11,267	29,500	8,833	8,833	8,708	36,775
Andorra	2,491	2,491	2,491	2,491	2,642	2,642	2,642	2,642
Austria	1,397,000	1,240,000	1,363,426	1,439,642	1,139,971	1,131,587	1,307,883	1,381,465
Belgium	3,219,000	3,826,000	3,985,938	3,090,360	2,311,685	2,979,403	3,375,693	2,650,514
Bosnia and Herzegovina	14,000	59,666	74,480	74,000	10,240	52,760	85,188	95,276
Bulgaria	130,000	212,000	263,499	296,132	95,276	188,773	251,250	295,922
Croatia	196,200	208,000	207,000	270,000	202,218	190,618	196,760	255,752
Cyprus	54,610	63,614	75,795	55,192	54,845	66,151	85,207	67,016
Czech Republic	581,000	1,270,000	1,289,000	1,287,600	435,034	850,718	1,106,895	702,619
Denmark	1,151,000	1,207,876	1,026,095	761,665	842,217	999,956	989,792	702,619
Estonia	64,610	93,857	136,516	151,896	42,767	82,263	138,460	161,441
Finland	356,150	469,847	447,842	449,728	282,643	423,916	384,370	434,991
France	6,130,550	6,089,255	5,604,820	4,956,116	4,508,114	5,185,946	5,327,665	4,970,200
Germany	9,810,000	10,618,000	10,803,879	10,575,000	6,955,345	9,014,643	9,927,353	10,319,567
Greece	681,932	709,721	719,898	537,352	511,517	621,103	657,238	541,433
Hungary	495,300	689,348	799,938	776,917	354,288	582,941	770,251	781,442
Iceland	34,849	38,639	27,620	35,827	30,818	35,528	28,427	29,132
Ireland	431,000	380,972	370,229	427,698	391,032	378,283	414,365	451,653
Italy	4,385,000	4,382,798	5,122,277	4,635,993	2,952,423	3,325,005	4,376,628	4,311,713
Latvia	85,290	149,686	152,501	189,685	62,426	123,229	139,209	193,033
Liechtenstein	n.a.	n.a.	0	0	n.a.	n.a.	n.a.	n.a.
Lithuania	78,250	151,752	195,261	261,981	58,547	136,686	208,496	287,640
Luxembourg	107,759	195,861	205,478	141,390	117,188	233,701	250,384	69,041
Malta	35,700	29,780	40,771	19,636	43,029	54,625	68,346	69,041
Monaco	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Montenegro	6,557	6,557	6,557	10,790	6,674	6,674	6,674	11,040
Netherlands	3,210,000	3,385,700	3,035,600	2,570,000	2,320,748	2,948,107	2,938,984	2,735,312
Norway	466,000	475,739	404,505	439,850	378,658	454,913	422,205	445,511
Poland	1,229,100	2,157,800	3,051,637	3,296,365	947,832	1,693,060	2,646,510	3,037,172
Portugal	643,566	757,000	802,209	778,995	526,165	687,019	820,725	665,121
Romania	147,100	351,000	429,594	582,585	119,798	298,506	380,911	614,718
San Marino	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Serbia	169,500	426,000	329,178	363,000	158,200	439,337	308,072	281,302
Slovakia	247,000	362,000	435,313	470,719	162,648	299,973	601,725	427,514
Slovenia	181,780	250,858	261,842	359,365	136,879	202,997	218,729	281,302
Spain	3,475,509	3,857,000	4,524,535	2,822,384	2,402,670	2,668,442	2,158,927	2,856,168
Sweden	754,000	852,997	912,267	878,424	574,927	782,407	840,823	845,325
Switzerland	979,340	1,146,850	919,346	782,615	882,999	1,360,694	1,128,424	1,031,110
The former Yugoslav Republic of Macedonia	37,381	27,330	60,371	58,913	25,874	22,471	56,304	445,511
United Kingdom	6,667,808	7,663,000	7,253,764	6,390,000	5,026,284	6,244,770	6,176,417	5,698,481
ECE Central	47,674,351	53,827,013	55,352,739	50,269,806	35,083,454	44,778,680	48,806,640	48,186,514
Armenia	3,572	9,992	17,065	27,110	4,447	9,536	26,286	41,318
Azerbaijan	9,794	26,600	52,900	61,000	10,203	13,155	31,632	44,338
Georgia	6,299	6,299	27,785		3,906	3,906	27,973	
Israel	596,353	624,957	673,036	580,190	397,007	453,863	538,115	488,767
Kazakhstan	54,022	143,400	183,656	166,691	49,190	122,066	218,595	217,256
Kyrgyzstan	10,440	17,753	20,314	29,500	6,987	11,743	19,839	28,768
Tajikistan	1,225	990	990	8,780	678	1,200	1,200	19,710
Turkey	1,005,540	2,068,000	2,700,004	2,792,992	752,791	1,752,680	2,266,366	2,476,044
Turkmenistan	960	960	960	25,406	1,175	1,175	1,175	32,461
Uzbekistan	24,900	47,022	82,462	90,840	25,606	48,058	77,215	92,253
ECE South-East	1,713,105	2,945,973	3,759,172	3,782,509	1,251,990	2,417,382	3,208,396	3,440,915
Canada	3,810,106	3,745,000	2,647,000	2,637,000	2,261,336	2,593,999	2,705,879	2,696,230
United States of America	16,278,887	16,756,359	9,938,080	9,735,000	11,706,545	12,479,787	8,873,378	9,408,207
ECE West	20,088,993	20,501,359	12,585,080	12,372,000	13,967,881	15,073,786	11,579,257	12,104,437
ECE Total	70,249,113	79,196,367	74,197,829	68,715,649	50,846,539	64,063,635	66,832,143	66,684,301
EU-28	45,946,214	51,625,722	53,516,924	48,472,820	33,578,516	42,394,828	46,759,996	45,808,215

Data sources: FAOSTAT 2015.

Import								Country
Roundwood (total, m ³)				Roundwood (total, 1,000 USD)				
2000	2005	2010	2013	2000	2005	2010	2013	
105,300	76,504	35,410	18,640	4,141	3,088	2,161	1,855	Belarus
30,500	30,500	41,364	36,804	1,351	1,351	3,122	2,759	Moldova
527,000	730,000	893	20,290	13,330	17,450	73	1,680	Russian Federation
57,757	170,218	19,041	14,200	8,623	10,132	2,083	1,381	Ukraine
720,557	1,007,222	96,708	89,934	27,445	32,021	7,439	7,675	ECE East
590	590	590	6,380	180	68	68	743	Albania
2,696	2,696	2,696	2,696	202	202	202	202	Andorra
8,590,000	8,901,000	8,651,751	9,031,123	440,764	616,746	791,636	911,138	Austria
4,024,000	3,207,000	4,254,764	4,864,760	155,647	145,082	261,597	316,972	Belgium
53,634	53,634	112,020	34,000	62	3,154	9,342	3,845	Bosnia and Herzegovina
105,000	48,037	39,815	44,222	4,274	2,931	3,351	2,934	Bulgaria
96,000	63,000	13,000	12,000	2,535	2,926	1,565	1,352	Croatia
2,110	493	594	1,668	683	141	286	336	Cyprus
954,000	1,162,000	1,049,000	2,498,000	40,866	74,273	87,328	197,387	Czech Republic
637,000	771,072	1,140,263	566,154	48,324	69,178	83,302	70,066	Denmark
346,480	1,883,926	336,396	298,539	14,046	106,408	29,826	32,040	Estonia
10,004,597	16,211,820	6,407,984	6,770,193	352,758	807,152	444,527	463,004	Finland
2,043,152	2,393,854	1,733,081	1,355,485	278,808	289,203	206,400	153,978	France
3,596,000	3,421,000	8,071,435	8,710,359	318,196	320,877	653,773	773,834	Germany
445,371	327,835	409,790	379,256	34,557	31,531	24,421	28,584	Greece
353,700	350,000	509,449	282,027	19,192	18,929	23,664	18,764	Hungary
3,817	604	92	1,348	1,095	187	19	100	Iceland
107,000	232,911	121,298	252,915	26,003	65,409	42,555	39,841	Ireland
6,295,000	5,620,037	4,150,000	3,742,532	518,266	524,881	442,212	387,861	Italy
136,030	1,086,681	438,237	989,285	6,966	66,572	25,471	78,186	Latvia
0	0	0	0	n.a.	n.a.	n.a.	n.a.	Liechtenstein
60,570	287,906	332,142	383,973	4,838	17,645	20,433	23,723	Lithuania
763,803	412,573	790,475	1,098,741	20,549	27,598	40,770	36,291	Luxembourg
4,340	20	321	598	221	23	175	315	Malta
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Monaco
4,507	4,507	4,507	30	328	328	328	5,782	Montenegro
388,000	316,195	236,300	299,254	34,223	26,329	29,410	34,766	Netherlands
3,348,000	3,255,722	1,478,800	782,544	147,074	208,908	130,836	69,475	Norway
732,400	2,045,400	2,323,826	2,294,768	36,385	100,102	124,526	124,775	Poland
1,342,139	363,523	856,259	2,430,667	158,928	99,027	116,581	265,796	Portugal
20,400	336,037	611,067	1,343,539	1,186	19,930	43,441	87,824	Romania
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	San Marino
24,000	28,000	105,310	97,000	1,767	1,989	6,564	5,782	Serbia
129,000	104,531	650,237	883,761	3,244	3,901	28,513	52,604	Slovakia
495,910	409,084	306,861	574,737	22,435	41,552	33,652	60,854	Slovenia
3,789,318	3,684,000	1,841,174	2,052,936	271,137	199,164	91,530	151,788	Spain
11,897,535	8,849,968	6,791,223	8,038,993	484,197	523,521	467,670	595,520	Sweden
304,130	212,696	299,029	261,055	29,565	19,610	33,712	30,746	Switzerland
38,321	796	119,693	40,796	994	33	4,228	1,516	The former Yugoslav Republic of Macedonia
258,912	448,182	345,018	434,828	70,539	118,813	108,986	66,244	United Kingdom
61,397,462	66,497,330	54,534,497	60,861,162	3,551,034	4,554,323	4,412,900	5,094,968	ECE Central
1,000	1,000	2	6,380	40	114	1	185	Armenia
1,100	4,091	10,700	4,000	61	506	1,274	401	Azerbaijan
1	1	16,735		143	143	1,709		Georgia
42,697	12,606	5,375	8,260	12,144	1,460	867	689	Israel
76,050	175,326	85,289	196,456	2,748	7,776	8,937	14,861	Kazakhstan
2,700	3,502	3,308	1,600	152	321	380	267	Kyrgyzstan
0	0	0	15,870	395	395	395	980	Tajikistan
1,883,000	2,303,600	1,416,000	700,100	128,616	220,334	161,041	109,457	Turkey
0	0	0	12,994	75	75	75	4,023	Turkmenistan
72,487	206,954	274,381	287,866	3,044	8,842	19,610	30,251	Uzbekistan
2,079,035	2,707,080	1,811,790	1,233,526	147,418	239,966	194,289	161,114	ECE South-East
6,539,938	6,345,655	4,839,948	4,946,000	383,830	426,953	313,907	314,213	Canada
2,571,000	3,753,855	899,969	1,137,000	222,613	302,643	75,995	100,307	United States of America
9,110,938	10,099,510	5,739,917	6,083,000	606,443	729,596	389,902	414,520	ECE West
73,307,992	80,311,142	62,182,912	68,267,622	4,332,340	5,555,906	5,004,530	5,678,277	ECE Total
57,617,767	62,938,085	52,411,760	59,635,313	3,369,767	4,319,844	4,227,601	4,976,777	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 12e
Trade in wood

Country	Import							
	Sawnwood (total, m ³)				Sawnwood (total, 1,000 USD)			
	2000	2005	2010	2013	2000	2005	2010	2013
Belarus	70,600	115,500	8,898	14,000	5,557	11,362	3,088	5,779
Moldova	109,700	109,700	143,400	126,715	4,336	4,336	16,008	19,621
Russian Federation	21,000	24,000	29,964	30,890	3,790	7,620	13,404	16,494
Ukraine	249,500	18,470	7,043	6,960	6,636	2,738	3,689	2,868
ECE East	450,800	267,670	189,305	178,565	20,319	26,056	36,189	44,762
Albania	14,652	23,890	23,890	76,660	970	4,242	4,242	13,517
Andorra	10,025	10,025	10,025	10,025	2,648	2,648	2,648	2,648
Austria	1,663,000	1,500,000	1,797,342	1,905,702	271,416	389,397	535,970	597,141
Belgium	2,223,000	2,467,000	2,152,558	2,188,280	569,477	671,200	705,364	750,186
Bosnia and Herzegovina	20,600	16,655	39,270	76,000	5,705	4,821	9,230	17,125
Bulgaria	18,000	75,840	14,145	21,334	1,991	8,935	6,472	8,700
Croatia	238,800	309,000	239,000	156,000	27,136	60,924	53,637	38,570
Cyprus	66,800	134,780	73,642	28,982	18,010	41,173	29,890	13,812
Czech Republic	336,000	535,000	449,000	476,000	53,112	122,396	148,373	153,077
Denmark	2,925,000	2,200,547	1,831,415	1,416,134	505,429	592,395	424,226	377,841
Estonia	199,340	627,206	641,967	864,041	18,008	100,991	162,400	230,713
Finland	341,398	511,408	627,303	354,605	78,138	128,201	156,566	95,086
France	3,341,059	4,023,103	3,834,085	2,491,006	784,469	1,188,252	1,239,343	999,392
Germany	6,344,000	4,878,000	4,384,498	4,354,606	1,272,751	1,285,976	1,345,896	1,371,276
Greece	757,610	874,151	370,480	223,080	137,628	212,820	114,173	63,118
Hungary	1,139,300	985,000	461,345	396,500	115,631	158,866	107,512	102,158
Iceland	94,000	113,338	54,060	79,281	22,391	34,913	21,815	21,267
Ireland	646,000	955,279	242,031	134,268	186,326	306,420	97,862	68,197
Italy	8,380,000	7,727,326	6,134,000	4,653,702	1,651,699	1,910,439	1,723,213	1,308,148
Latvia	135,450	616,033	201,201	268,002	12,517	95,801	41,846	61,730
Liechtenstein	n.a.	n.a.	o	o	n.a.	n.a.	n.a.	n.a.
Lithuania	279,410	658,230	291,274	380,621	28,724	125,566	75,869	121,598
Luxembourg	63,862	58,075	125,812	99,185	12,284	16,429	26,682	32,102
Malta	22,000	22,460	15,320	17,773	9,391	12,075	8,774	6,780
Monaco	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Montenegro	3,949	3,949	3,949	4,540	1,583	1,583	1,583	1,319
Netherlands	3,705,000	3,099,500	2,750,000	2,363,000	832,418	909,593	933,237	804,200
Norway	945,000	1,042,032	947,956	1,055,392	238,562	331,093	357,089	370,168
Poland	378,500	668,600	714,722	655,446	65,053	167,317	227,431	252,794
Portugal	297,227	333,000	208,384	164,459	109,262	162,591	130,280	77,355
Romania	7,500	29,000	42,904	54,511	2,784	10,663	21,837	33,160
San Marino	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Serbia	372,000	356,000	357,000	270,904	34,430	48,699	66,587	56,181
Slovakia	55,000	38,000	294,999	193,157	7,984	22,932	104,534	79,580
Slovenia	197,500	214,715	959,090	1,090,717	45,241	72,824	196,072	237,628
Spain	3,164,651	3,391,000	1,324,400	828,020	754,200	817,734	304,048	241,761
Sweden	348,091	348,000	422,255	454,919	113,848	182,550	168,893	204,185
Switzerland	453,380	399,515	481,926	427,494	135,299	175,365	259,800	236,794
The former Yugoslav Republic of Macedonia	154,366	98,871	80,741	43,807	15,182	10,410	11,365	11,310
United Kingdom	7,852,500	8,340,917	5,699,069	5,493,807	1,672,828	2,038,080	1,852,355	1,847,251
ECE Central	47,193,970	47,685,445	38,301,058	33,771,960	9,814,525	12,426,314	11,677,114	10,907,868
Armenia	8,640	30,100	44,757	22,949	1,070	2,923	9,937	7,757
Azerbaijan	192,361	525,782	466,000	741,886	14,619	26,500	91,416	166,613
Georgia	800	200	2,118	n.a.	45	77	635	n.a.
Israel	386,463	407,123	495,914	716,250	126,406	137,726	222,590	213,559
Kazakhstan	482,134	812,545	514,211	455,871	18,946	50,435	94,650	78,890
Kyrgyzstan	43,100	96,910	171,493	347,100	2,252	9,168	27,064	74,721
Tajikistan	40,380	109,000	58,900	853,580	1,877	19,000	10,101	89,318
Turkey	312,000	469,350	664,000	954,000	32,841	65,704	132,290	238,438
Turkmenistan	23,803	23,803	23,803	323,960	1,877	1,877	1,877	90,534
Uzbekistan	32,500	2,312	1,712,444	2,423,524	1,670	868	215,067	450,036
ECE South-East	1,522,181	2,477,125	4,153,640	6,839,120	201,603	314,278	805,627	1,409,866
Canada	1,736,025	2,226,270	1,410,876	1,447,000	561,458	549,749	473,426	515,903
United States of America	34,390,823	43,504,381	16,575,803	20,049,400	7,060,497	8,987,751	3,412,054	5,068,218
ECE West	36,126,848	45,730,651	17,986,679	21,496,400	7,621,955	9,537,500	3,885,480	5,584,121
ECE Total	85,293,799	96,160,891	60,630,682	62,286,045	17,658,402	22,304,148	16,404,410	17,946,617
EU-28	45,125,998	45,621,170	36,302,241	31,727,857	9,357,755	11,812,540	10,942,755	10,177,539

Data sources: FAOSTAT 2015.

Import								Country
Wood-based panels (total, m ³)				Wood-based panels (total, 1,000 USD)				
2000	2005	2010	2013	2000	2005	2010	2013	
105,885	189,900	549,717	538,000	24,224	47,790	137,263	187,857	Belarus
24,631	24,631	100	133,806	2,340	2,340	31	48,345	Moldova
375,500	1,126,400	1,137,883	2,197,430	81,003	285,501	512,299	835,513	Russian Federation
109,409	594,745	479,594	830,430	20,562	96,652	154,423	291,520	Ukraine
615,425	1,935,676	2,167,294	3,699,666	128,129	432,283	804,016	1,363,235	ECE East
10,522	111,839	98,239	177,390	5,709	11,534	21,714	37,039	Albania
1,706	1,706	1,706	1,706	865	865	865	865	Andorra
688,000	772,000	809,212	860,525	249,880	382,759	439,747	475,148	Austria
1,418,000	1,850,000	1,875,626	1,852,670	478,288	752,738	669,860	704,934	Belgium
31,020	146,837	181,310	186,000	6,580	45,519	60,212	70,109	Bosnia and Herzegovina
41,874	308,190	312,174	248,004	11,300	75,307	93,961	110,510	Bulgaria
122,392	266,000	238,000	278,760	40,844	92,022	82,881	94,917	Croatia
80,890	170,920	108,695	50,835	17,396	44,916	37,364	18,090	Cyprus
462,000	583,000	740,000	1,000,060	108,219	208,199	224,605	285,056	Czech Republic
1,032,000	1,490,074	882,935	623,758	257,732	408,911	222,333	235,454	Denmark
182,030	196,132	175,609	202,772	30,183	76,022	69,196	95,390	Estonia
197,000	313,210	398,097	366,657	62,174	149,356	192,234	199,987	Finland
1,615,599	2,021,936	2,498,783	2,117,770	590,217	1,009,625	1,187,618	1,227,305	France
4,066,000	4,135,000	4,552,156	4,984,227	1,263,931	1,624,035	2,039,124	2,196,065	Germany
386,633	427,214	324,963	222,006	90,991	182,519	114,059	99,380	Greece
250,800	474,000	441,280	553,570	82,404	173,993	159,974	204,150	Hungary
32,000	22,372	17,139	37,449	13,798	16,925	12,111	14,393	Iceland
284,000	328,372	165,881	193,853	96,651	194,404	86,822	104,073	Ireland
1,729,000	2,092,147	3,043,000	2,382,741	591,030	967,438	1,017,197	956,636	Italy
41,980	135,854	150,899	225,265	11,486	50,147	49,459	70,180	Latvia
n.a.	n.a.	0	0	n.a.	n.a.	n.a.	n.a.	Liechtenstein
115,380	381,124	453,130	541,372	26,024	117,089	142,129	206,462	Lithuania
58,501	49,892	52,615	78,267	18,729	16,932	22,113	29,154	Luxembourg
25,500	37,240	22,846	81,001	8,887	9,112	8,969	8,460	Malta
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Monaco
26,692	26,692	26,692	27,310	9,036	9,036	9,036	9,927	Montenegro
1,727,000	1,642,500	1,482,600	1,364,000	525,670	693,211	742,875	693,966	Netherlands
216,861	272,759	361,989	412,162	114,795	195,036	250,673	294,244	Norway
687,700	1,523,700	1,713,329	1,735,009	179,923	489,167	612,272	591,198	Poland
246,025	301,000	504,333	497,473	98,660	156,859	209,327	197,915	Portugal
225,600	698,833	695,405	449,845	64,371	298,412	291,671	229,157	Romania
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	San Marino
141,000	187,000	293,000	250,600	34,670	45,816	101,860	99,974	Serbia
334,000	318,000	486,000	449,204	50,964	166,214	246,190	210,100	Slovakia
131,880	295,338	250,006	234,288	54,373	123,323	119,991	119,971	Slovenia
1,179,490	1,606,000	1,018,004	918,882	392,740	584,901	346,754	402,221	Spain
667,354	961,112	1,104,538	948,531	243,837	430,791	481,364	495,781	Sweden
516,910	568,557	562,252	563,399	256,297	363,471	325,110	377,793	Switzerland
58,065	75,741	73,284	115,307	10,761	22,403	33,197	40,303	The former Yugoslav Republic of Macedonia
3,306,728	3,938,528	2,700,996	2,962,670	1,038,592	1,448,695	1,206,654	1,370,295	United Kingdom
22,338,132	28,730,819	28,816,723	28,195,338	7,138,007	11,637,702	11,931,521	12,576,602	ECE Central
8,837	39,908	80,527	99,761	2,073	5,517	27,936	39,999	Armenia
58,041	223,800	283,217	430,496	6,615	19,656	57,377	74,948	Azerbaijan
5,070	5,070	91,678	n.a.	603	603	30,127	n.a.	Georgia
281,599	416,217	499,325	543,810	116,369	145,612	213,777	221,621	Israel
146,877	503,270	390,432	830,506	16,798	101,669	200,696	261,886	Kazakhstan
39,663	31,903	97,986	239,908	2,769	9,845	29,328	65,852	Kyrgyzstan
8,684	0	0	120,510	1,144	0	0	779,184	Tajikistan
535,000	1,130,206	1,059,200	1,386,800	99,420	381,199	531,806	32,438	Turkey
2,924	2,924	2,924	109,583	742	742	742	69,433	Turkmenistan
319,037	195,731	438,796	548,970	16,293	59,410	93,996	184,525	Uzbekistan
1,405,732	2,549,029	2,944,085	4,310,344	262,826	724,253	1,185,785	1,729,886	ECE South-East
1,539,172	2,171,000	2,950,805	2,878,300	445,882	820,800	948,917	1,031,409	Canada
13,933,033	20,730,604	7,746,543	10,079,940	3,372,128	7,096,740	3,156,261	4,719,390	United States of America
15,472,205	22,901,604	10,697,348	12,958,240	3,818,010	7,917,540	4,105,178	5,750,799	ECE West
39,831,494	56,117,128	44,625,450	49,163,588	11,346,972	20,711,778	18,026,500	21,420,522	ECE Total
21,303,356	27,317,316	27,201,112	26,424,015	6,685,496	10,927,097	11,116,743	11,631,955	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 12f
Trade in wood

Country	Import Wood pulp (tonnes)			
	2000	2005	2010	2013
Belarus	40,832	39,400	48,126	13,840
Moldova	102	102	102	39
Russian Federation	52,200	25,300	60,860	119,443
Ukraine	54,827	91,440	87,242	71,570
ECE East	147,961	156,242	196,330	204,892
Albania	4,354	4,354	4,354	4,072
Andorra	n.a.	n.a.	n.a.	n.a.
Austria	594,000	660,047	615,037	714,821
Belgium	1,100,000	1,071,016	837,732	666,240
Bosnia and Herzegovina	1,862	33,674	34,580	37,000
Bulgaria	14,000	19,139	8,624	34,663
Croatia	111,700	1,000	404	60
Cyprus	1,980	2,223	62	58
Czech Republic	122,000	193,182	177,249	187,530
Denmark	52,150	63,990	72,922	56,959
Estonia	573	989	47	21,580
Finland	143,767	282,406	419,322	410,011
France	2,387,410	2,147,336	1,930,302	2,106,478
Germany	4,063,000	4,829,000	5,123,401	4,743,000
Greece	110,574	102,446	162,419	152,820
Hungary	173,100	265,015	87,801	106,292
Iceland	100	34	49	22
Ireland	33,000	20,435	40,610	54,461
Italy	3,193,000	3,757,892	3,425,366	3,472,745
Latvia	112	56	64	235
Liechtenstein	n.a.	n.a.	0	0
Lithuania	7,850	1,140	24,337	41,774
Luxembourg	4	28	1	85
Malta	350	41	38	234
Monaco	n.a.	n.a.	n.a.	n.a.
Montenegro	10	10	10	10
Netherlands	905,000	1,419,200	1,210,400	1,555,001
Norway	156,000	78,579	47,619	49,866
Poland	265,700	489,020	678,920	853,222
Portugal	94,233	75,980	34,788	127,930
Romania	3,800	14,022	73,873	99,501
San Marino	n.a.	n.a.	n.a.	n.a.
Serbia	17,100	11,000	34,085	48,000
Slovakia	76,000	96,000	199,029	139,821
Slovenia	164,283	194,596	211,096	204,786
Spain	669,227	880,619	1,184,796	1,119,215
Sweden	307,350	466,691	443,170	421,782
Switzerland	465,230	507,241	471,795	164,321
The former Yugoslav Republic of Macedonia	2,916	532	343	117
United Kingdom	1,736,335	1,627,309	1,061,000	1,077,881
ECE Central	16,978,070	19,316,242	18,615,645	18,672,593
Armenia	n.a.	90	n.a.	750
Azerbaijan	0	57	100	190
Georgia	195	195	78	
Israel	111,703	158,798	163,461	146,030
Kazakhstan	2,310	742	3,886	8,733
Kyrgyzstan	0	405	0	0
Tajikistan	n.a.	0	0	190
Turkey	320,000	486,666	627,000	938,150
Turkmenistan	0	0	0	10
Uzbekistan	1,820	2,857	1,581	3,040
ECE South-East	436,028	649,810	796,106	1,097,093
Canada	273,925	319,000	227,000	251,177
United States of America	6,596,000	6,134,589	5,591,374	5,567,896
ECE West	6,869,925	6,453,589	5,818,374	5,819,073
ECE Total	24,431,984	26,575,883	25,426,455	25,793,651
EU-28	16,330,498	18,680,818	18,022,810	18,369,185

Data sources: FAOSTAT 2015.

Import Wood pulp (total, 1,000 USD)				Country
2000	2005	2010	2013	
24,132	23,008	39,665	8,398	Belarus
20	20	20	60	Moldova
36,627	15,874	54,721	103,025	Russian Federation
32,287	46,584	68,353	50,959	Ukraine
93,066	85,486	162,759	162,442	ECE East
1,038	1,038	1,038	1,356	Albania
n.a.	n.a.	n.a.	n.a.	Andorra
365,944	396,453	500,193	523,045	Austria
684,049	600,502	780,199	636,526	Belgium
694	17,219	26,364	26,262	Bosnia and Herzegovina
9,601	10,740	7,698	24,611	Bulgaria
13,935	372	315	197	Croatia
1,583	1,597	60	54	Cyprus
77,994	111,745	144,587	145,273	Czech Republic
35,189	39,492	53,087	43,933	Denmark
262	164	44	13,319	Estonia
87,485	155,389	302,397	279,036	Finland
1,502,551	1,170,372	1,551,192	1,455,370	France
2,524,218	2,645,142	4,027,296	3,512,573	Germany
76,307	51,848	91,892	101,203	Greece
105,314	137,927	66,685	75,762	Hungary
35	35	29	18	Iceland
25,226	18,342	40,879	42,489	Ireland
1,910,010	1,903,944	2,501,636	2,273,557	Italy
82	50	65	270	Latvia
n.a.	n.a.	n.a.	n.a.	Liechtenstein
3,984	452	20,204	25,166	Lithuania
5	47	13	13	Luxembourg
236	26	30	1	Malta
n.a.	n.a.	n.a.	n.a.	Monaco
16	16	16	11	Montenegro
562,446	813,363	959,532	1,238,748	Netherlands
92,306	43,375	35,378	40,962	Norway
173,709	258,776	503,838	576,583	Poland
56,862	37,367	22,889	83,753	Portugal
1,381	8,220	58,856	66,383	Romania
n.a.	n.a.	n.a.	n.a.	San Marino
9,500	6,755	25,345	37,782	Serbia
46,503	64,052	160,608	93,982	Slovakia
100,164	106,838	153,647	134,571	Slovenia
408,895	379,519	507,257	747,779	Spain
184,237	252,370	330,346	285,864	Sweden
288,931	278,237	370,540	118,451	Switzerland
1,632	372	329	141	The former Yugoslav Republic of Macedonia
1,075,078	875,709	857,756	727,716	United Kingdom
10,427,402	10,387,865	14,102,240	13,332,760	ECE Central
n.a.	87	47	610	Armenia
0	30	101	323	Azerbaijan
100	100	94		Georgia
68,506	80,519	131,933	101,526	Israel
202	835	2,979	5,606	Kazakhstan
0	148	0	0	Kyrgyzstan
n.a.	0	0	145	Tajikistan
223,197	270,326	524,907	627,866	Turkey
0	0	0	47	Turkmenistan
1,069	2,703	1,661	3,098	Uzbekistan
293,074	354,748	661,722	739,221	ECE South-East
155,096	181,869	168,586	168,121	Canada
3,274,775	2,969,985	3,731,815	3,376,382	United States of America
3,429,871	3,151,854	3,900,401	3,544,503	ECE West
14,243,413	13,979,953	18,827,122	17,778,926	ECE Total
10,033,250	10,040,818	13,643,201	13,107,777	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 13a
Biological diversity

Country	Forest designation			Naturalness - Forest			
	Forest designation Conservation of biodiversity (1,000 ha)			Undisturbed by man (1,000 ha)			
	2000	2005	2010	2000	2005	2010	2015
Belarus	487	1,181	1,208	135	135	135	135
Moldova	44	61	64	0	0	0	0
Russian Federation	16,190	16,488	17,572	258,131	255,470	273,343	272,718
Ukraine	249	251	350	59	59	59	59
ECE East	16,970	17,981	19,194	258,325	255,664	273,537	272,912
Albania	83	96	189	262	262	122	62
Andorra	0	0	0	n.a.	n.a.	n.a.	n.a.
Austria	30	107	108	64	59	54	49
Belgium	0	209	209	0	0	0	0
Bosnia and Herzegovina	20	20	20	2	2	2	2
Bulgaria	46	34	22	270	304	597	n.a.
Croatia	39	47	54	7	7	7	7
Cyprus	3	3	3	13	13	13	13
Czech Republic	205	273	293	9	9	9	10
Denmark	19	22	40	32	31	32	34
Estonia	137	179	208	48	52	55	58
Finland	1,609	1,925	1,925	n.a.	n.a.	230	230
France	n.a.	n.a.	3,257	30	30	30	30
Germany	0	2,897	2,897	0	0	0	0
Greece	152	159	164	0	0	0	0
Hungary	175	419	424	0	0	0	0
Iceland	0	1	1	0	0	0	0
Ireland	0	83	83	n.a.	n.a.	n.a.	n.a.
Italy	2,874	3,062	3,265	93	93	93	93
Latvia	498	482	498	17	16	15	16
Liechtenstein	1	1	1	2	2	2	2
Lithuania	166	193	198	21	26	26	26
Luxembourg	0	0	0	0	0	0	0
Malta	0	0	0	0	0	0	0
Monaco	0	0	0	0	0	0	0
Montenegro	27	27	27	0	79	109	109
Netherlands	90	90	90	0	0	0	0
Norway	158	277	428	160	160	160	160
Poland	387	419	434	51	54	56	59
Portugal	170	170	171	24	24	24	24
Romania	308	309	317	300	300	300	283
San Marino	0	0	0	0	0	0	0
Serbia	125	128	126	1	1	1	1
Slovakia	81	81	81	24	24	24	24
Slovenia	83	84	575	53	49	49	49
Spain	1,962	1,997	2,270	0	0	0	0
Sweden	2,802	2,883	2,950	2,417	2,417	2,417	2,417
Switzerland	66	67	68	40	40	40	40
The former Yugoslav Republic of Macedonia	0	0	0	0	0	0	0
United Kingdom	n.a.	n.a.	290	0	0	0	0
ECE Central	12,317	16,745	21,687	3,940	4,053	4,467	3,798
Armenia	0	0	0	17	17	17	17
Azerbaijan	72	72	72	400	400	400	400
Georgia	520	520	520	500	500	500	500
Israel	27	27	27	0	0	0	0
Kazakhstan	33	530	530	0	0	0	0
Kyrgyzstan	52	64	85	240	241	269	269
Tajikistan	344	344	344	297	297	297	297
Turkey	803	860	1,069	837	859	881	913
Turkmenistan	104	104	104	104	104	104	104
Uzbekistan	211	275	210	57	57	72	72
ECE South-East	2,166	2,796	2,961	2,452	2,475	2,540	2,572
Canada	23,924	23,924	23,924	206,359	206,225	206,062	205,924
United States of America	60,715	60,846	65,050	72,305	75,709	75,294	75,300
ECE West	84,639	84,770	88,974	278,664	281,934	281,356	281,224
ECE Total	116,092	122,292	132,816	543,380	544,126	561,900	560,506
EU-28	11,837	16,128	20,827	3,473	3,508	4,032	3,423

Data sources: FAO/FRA (2000, 2005, 2010). Joint FOREST EUROPE/UNECE/FAO pan-European reporting (2011, 2014), national contacts and sources, secretariat's estimates - for more detailed information about sources of data and methods of estimation see web-based version.

Naturalness - Forest								Country
Semi-natural (1,000 ha)				Plantations (1,000 ha)				
2000	2005	2010	2015	2000	2005	2010	2015	
5,850	5,683	5,865	5,830	1,860	2,018	2,046	2,159	Belarus
323	362	384	384	1	1	2	0	Moldova
535,777	536,358	522,180	522,372	15,360	16,963	19,613	19,841	Russian Federation
9,120	9,082	9,146	9,230	331	334	343	368	Ukraine
551,071	551,485	537,575	537,816	17,553	19,315	22,004	22,368	ECE East
412	423	560	628	96	98	94	95	Albania
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Andorra
3,498	3,514	3,527	3,540	276	278	279	280	Austria
237	250	263	269	430	425	419	414	Belgium
2,059	2,239	2,342	2,342	124	124	128	128	Bosnia and Herzegovina
2,172	2,473	2,323	2,173	933	874	817	760	Bulgaria
1,775	1,794	1,813	1,814	103	102	100	101	Croatia
131	130	129	129	28	29	30	31	Cyprus
2,628	2,638	2,648	2,657	0	0	0	0	Czech Republic
110	104	101	101	443	422	454	464	Denmark
2,191	2,197	2,175	2,169	4	4	4	4	Estonia
17,492	16,242	15,212	15,212	4,953	5,901	6,775	6,775	Finland
13,730	14,076	14,291	14,291	1,593	1,608	1,633	1,633	France
11,354	11,384	11,409	11,419	0	0	0	0	Germany
3,472	3,618	3,763	3,763	129	134	140	140	Greece
971	1,042	1,089	1,112	803	811	833	835	Hungary
11	12	12	12	28	35	42	48	Iceland
82	82	71	71	553	613	655	683	Ireland
7,692	8,064	8,314	8,565	584	602	621	639	Italy
3,223	3,278	3,335	3,332	2	3	3	8	Latvia
5	5	5	5	0	0	0	0	Liechtenstein
1,999	2,095	2,144	2,154	0	0	0	0	Lithuania
59	59	59	59	28	28	28	28	Luxembourg
0	0	0	0	0	0	0	0	Malta
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	Monaco
0	540	710	710	0	7	8	8	Montenegro
356	361	369	373	4	4	4	4	Netherlands
n.a.	n.a.	11,827	n.a.	n.a.	n.a.	115	115	Norway
8,982	9,118	9,223	9,316	26	28	50	60	Poland
2,517	2,433	2,350	2,267	802	839	865	891	Portugal
4,665	4,685	4,827	6,009	1,401	1,406	1,433	569	Romania
0	0	0	0	0	0	0	0	San Marino
2,420	2,436	2,532	2,504	39	39	180	215	Serbia
1,877	1,889	1,896	1,897	20	19	19	19	Slovakia
1,144	1,157	1,166	1,165	36	37	32	34	Slovenia
14,473	14,733	15,366	15,509	2,504	2,549	2,882	2,909	Spain
25,128	25,159	25,015	24,963	618	642	642	693	Sweden
1,154	1,176	1,194	1,212	0	1	1	2	Switzerland
n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	The former Yugoslav Republic of Macedonia
n.a.	344	n.a.	n.a.	n.a.	2,716	2,716	n.a.	United Kingdom
138,018	139,749	152,059	141,742	16,561	20,379	22,003	18,587	ECE Central
305	305	305	305	11	10	21	21	Armenia
516	516	516	516	20	20	20	20	Azerbaijan
2,200	2,212	2,250	2,250	60	61	61	61	Georgia
65	67	66	66	88	88	88	89	Israel
2,309	2,428	2,408	2,408	1,056	909	901	901	Kazakhstan
559	562	628	628	59	66	57	57	Kyrgyzstan
12	12	12	12	101	101	101	101	Tajikistan
7,394	7,611	7,482	7,644	1,952	2,192	2,840	3,386	Turkey
4,023	4,023	4,023	4,023	0	0	0	0	Turkmenistan
2,691	2,644	2,569	2,569	464	594	635	635	Uzbekistan
20,074	20,380	20,259	20,421	3,811	4,041	4,723	5,270	ECE South-East
132,098	129,641	127,265	125,361	9,345	11,710	13,975	15,784	Canada
212,175	207,639	210,879	208,431	22,560	24,425	25,564	26,364	United States of America
344,273	337,280	338,144	333,792	31,905	36,135	39,539	42,148	ECE West
1,053,435	1,048,894	1,048,036	1,033,771	69,829	79,870	88,269	88,373	ECE Total
131,957	132,918	132,877	134,329	16,273	20,074	21,434	17,975	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 13b
Biological diversity

Country	Naturalness - Other wooded land							
	Undisturbed by man (1,000 ha)				Semi-natural (1,000 ha)			
	2000	2005	2010	2015	2000	2005	2010	2015
Belarus	n.a.	n.a.	n.a.	n.a.	915	499	541	600
Moldova	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0
Russian Federation	71,607	73,169	73,220	0	n.a.	n.a.	n.a.	0
Ukraine	0	0	0	0	41	41	26	26
ECE East	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Albania	0	0	n.a.	n.a.	262	261	267	452
Andorra	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0
Austria	55	60	66	63	61	66	73	80
Belgium	0	0	0	0	27	30	33	36
Bosnia and Herzegovina	0	0	0	0	549	549	549	549
Bulgaria	0	0	0	0	n.a.	n.a.	n.a.	n.a.
Croatia	0	0	0	0	415	484	554	569
Cyprus	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Czech Republic	0	0	0	0	0	0	0	0
Denmark	n.a.	10	16	14	4	4	6	6
Estonia	29	34	42	42	65	76	92	92
Finland	n.a.	n.a.	16	16	n.a.	n.a.	584	584
France	0	0	0	0	1,812	1,715	1,618	1,618
Germany	0	0	0	0	0	0	0	0
Greece	0	0	0	0	2,924	2,780	2,636	2,636
Hungary	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Iceland	0	0	0	0	129	132	135	138
Ireland	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Italy	0	0	0	0	1,565	1,620	1,673	1,673
Latvia	0	0	0	0	123	118	113	112
Liechtenstein	0	0	0	0	0	0	0	0
Lithuania	0	0	0	0	83	73	84	104
Luxembourg	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Malta	0	0	0	0	0	0	0	0
Monaco	0	0	0	0	n.a.	n.a.	n.a.	n.a.
Montenegro	0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Netherlands	0	0	0	0	0	0	0	0
Norway	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Poland	0	0	0	0	0	0	0	0
Portugal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Romania	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	90
San Marino	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Serbia	0	0	0	0	521	521	410	508
Slovakia	0	0	0	0	0	0	0	0
Slovenia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Spain	0	0	0	0	10,360	10,259	9,278	9,209
Sweden	n.a.	1,112	1,136	1,136	n.a.	1,432	1,296	1,296
Switzerland	8	9	9	9	55	58	60	61
The former Yugoslav Republic of Macedonia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
United Kingdom	0	0	0	0	0	0	0	0
ECE Central	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Armenia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Azerbaijan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Georgia	n.a.	n.a.	n.a.	n.a.	235	235	235	235
Israel	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kazakhstan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kyrgyzstan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Tajikistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Turkey	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Turkmenistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Uzbekistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE South-East	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Canada	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
United States of America	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE West	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE Total	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
EU-28	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Data sources: FAO/FRA (2000, 2005, 2010). Joint FOREST EUROPE/UNECE/FAO pan-European reporting (2011, 2014), national contacts and sources, secretariat's estimates - for more detailed information about sources of data and methods of estimation see web-based version.

Naturalness - Other wooded land				Country
Plantations (1,000 ha)				
2000	2005	2010	2015	
n.a.	n.a.	n.a.	n.a.	Belarus
n.a.	n.a.	n.a.	n.a.	Moldova
n.a.	n.a.	n.a.	0	Russian Federation
0	0	0	0	Ukraine
n.a.	n.a.	n.a.	n.a.	ECE East
0	0	0	0	Albania
n.a.	n.a.	n.a.	n.a.	Andorra
1	1	1	1	Austria
0	0	0	0	Belgium
0	0	0	0	Bosnia and Herzegovina
n.a.	n.a.	n.a.	n.a.	Bulgaria
0	0	0	0	Croatia
n.a.	n.a.	n.a.	n.a.	Cyprus
0	0	0	0	Czech Republic
n.a.	27	25	26	Denmark
0	0	0	0	Estonia
n.a.	n.a.	201	201	Finland
0	0	0	0	France
0	0	0	0	Germany
0	0	0	0	Greece
n.a.	n.a.	n.a.	n.a.	Hungary
1	3	4	6	Iceland
n.a.	n.a.	n.a.	n.a.	Ireland
85	88	88	88	Italy
0	0	0	0	Latvia
0	0	0	0	Liechtenstein
0	0	0	0	Lithuania
n.a.	n.a.	n.a.	n.a.	Luxembourg
0	0	0	0	Malta
n.a.	n.a.	n.a.	n.a.	Monaco
n.a.	n.a.	n.a.	n.a.	Montenegro
0	0	0	0	Netherlands
n.a.	n.a.	n.a.	n.a.	Norway
0	0	0	0	Poland
n.a.	n.a.	n.a.	n.a.	Portugal
n.a.	n.a.	n.a.	n.a.	Romania
n.a.	n.a.	n.a.	n.a.	San Marino
0	0	0	0	Serbia
0	0	0	0	Slovakia
n.a.	n.a.	n.a.	n.a.	Slovenia
0	0	0	0	Spain
0	0	0	0	Sweden
0	0	0	0	Switzerland
n.a.	n.a.	n.a.	n.a.	The former Yugoslav Republic of Macedonia
0	0	0	0	United Kingdom
n.a.	n.a.	n.a.	n.a.	ECE Central
n.a.	n.a.	n.a.	n.a.	Armenia
n.a.	n.a.	n.a.	n.a.	Azerbaijan
n.a.	0	n.a.	n.a.	Georgia
n.a.	n.a.	n.a.	n.a.	Israel
n.a.	n.a.	n.a.	n.a.	Kazakhstan
n.a.	n.a.	n.a.	n.a.	Kyrgyzstan
n.a.	n.a.	n.a.	n.a.	Tajikistan
n.a.	n.a.	n.a.	n.a.	Turkey
n.a.	n.a.	n.a.	n.a.	Turkmenistan
n.a.	n.a.	n.a.	n.a.	Uzbekistan
n.a.	n.a.	n.a.	n.a.	ECE South-East
n.a.	n.a.	n.a.	n.a.	Canada
n.a.	n.a.	n.a.	n.a.	United States of America
n.a.	n.a.	n.a.	n.a.	ECE West
n.a.	n.a.	n.a.	n.a.	ECE Total
n.a.	n.a.	n.a.	n.a.	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 13c
Biological diversity

Country	Deadwood standing					
	Forest (m ³ /ha)			Other wooded land (m ³ /ha)		
	2000	2005	2010	2000	2005	2010
Belarus	1.2	0.7	0.8	1.3	0.8	0.8
Moldova	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Russian Federation	6.6	6.6	6.7	3.6	3.8	3.9
Ukraine	1.1	1.2	1.2	n.a.	n.a.	n.a.
ECE East	3.0	2.8	2.9	n.a.	n.a.	n.a.
Albania	0.0	0.5	0.5	0.0	0.1	0.1
Andorra	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Austria	5.3	6.6	7.5	0.0	0.0	0.0
Belgium	2.8	2.8	2.9	n.a.	n.a.	n.a.
Bosnia and Herzegovina	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Bulgaria	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Croatia	6.0	6.0	6.0	n.a.	n.a.	n.a.
Cyprus	0.9	0.9	0.9	n.a.	n.a.	n.a.
Czech Republic	n.a.	4.8	4.8	0.0	0.0	0.0
Denmark	n.a.	2.9	4.0	n.a.	0.1	1.3
Estonia	5.9	6.9	7.9	0.4	0.8	0.9
Finland	1.3	1.6	1.7	0.4	0.6	0.8
France	n.a.	n.a.	7.0	n.a.	n.a.	n.a.
Germany	2.4	5.5	4.7	0.0	0.0	0.0
Greece	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Hungary	6.3	7.2	4.6	n.a.	n.a.	n.a.
Iceland	0.0	0.0	0.0	0.0	0.0	0.0
Ireland	n.a.	2.7	3.2	n.a.	n.a.	n.a.
Italy	5.0	5.3	5.6	n.a.	n.a.	n.a.
Latvia	n.a.	6.9	9.2	0.0	0.0	0.0
Liechtenstein	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Lithuania	23.0	23.0	23.0	3.0	3.0	3.0
Luxembourg	4.4	4.4	4.4	n.a.	n.a.	n.a.
Malta	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Monaco	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Montenegro	2.5	2.5	3.1	0.3	0.3	0.1
Netherlands	3.6	4.6	5.7	0.0	0.0	0.0
Norway	2.3	n.a.	3.4	n.a.	n.a.	n.a.
Poland	n.a.	n.a.	2.7	n.a.	n.a.	n.a.
Portugal	n.a.	2.7	n.a.	n.a.	n.a.	n.a.
Romania	n.a.	n.a.	0.1	n.a.	n.a.	0.0
San Marino	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Serbia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Slovakia	n.a.	n.a.	12.4	n.a.	n.a.	4.6
Slovenia	4.2	4.8	7.1	0.9	0.9	0.9
Spain	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sweden	n.a.	2.9	3.1	n.a.	0.8	0.7
Switzerland	9.5	11.7	11.9	0.8	0.8	0.8
The former Yugoslav Republic of Macedonia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
United Kingdom	0.8	0.8	0.8	0.0	0.0	0.0
ECE Central	4.5	4.9	5.3	n.a.	n.a.	n.a.
Armenia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Azerbaijan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Georgia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Israel	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kazakhstan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kyrgyzstan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Tajikistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Turkey	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Turkmenistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Uzbekistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE South-East	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Canada	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
United States of America	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE West	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE Total	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
EU-28	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Data sources: FAO/FRA (2000, 2005, 2010). Joint FOREST EUROPE/UNECE/FAO pan-European reporting (2011, 2014), national contacts and sources, secretariat's estimates - for more detailed information about sources of data and methods of estimation see web-based version.

Deadwood standing			Country
Total forest and other wooded land (m ³ /ha)			
2000	2005	2010	
2.5	1.5	1.6	Belarus
n.a.	n.a.	n.a.	Moldova
10.2	10.4	10.6	Russian Federation
n.a.	n.a.	n.a.	Ukraine
n.a.	n.a.	n.a.	ECE East
0.0	0.6	0.6	Albania
n.a.	n.a.	n.a.	Andorra
0.0	0.0	0.0	Austria
2.8	2.8	2.9	Belgium
n.a.	n.a.	n.a.	Bosnia and Herzegovina
n.a.	n.a.	n.a.	Bulgaria
6.0	6.0	6.0	Croatia
0.9	0.9	0.9	Cyprus
n.a.	4.8	4.8	Czech Republic
n.a.	2.9	4.0	Denmark
6.3	7.7	8.8	Estonia
1.3	1.6	1.7	Finland
n.a.	n.a.	7.0	France
2.4	5.5	4.7	Germany
n.a.	n.a.	n.a.	Greece
6.3	7.2	4.6	Hungary
0.0	0.0	0.0	Iceland
n.a.	n.a.	n.a.	Ireland
n.a.	n.a.	n.a.	Italy
n.a.	6.9	9.2	Latvia
n.a.	n.a.	n.a.	Liechtenstein
22.3	22.3	22.3	Lithuania
4.4	4.4	4.4	Luxembourg
n.a.	n.a.	n.a.	Malta
n.a.	n.a.	n.a.	Monaco
2.1	2.1	2.7	Montenegro
3.6	4.6	5.7	Netherlands
n.a.	n.a.	n.a.	Norway
n.a.	n.a.	n.a.	Poland
n.a.	n.a.	n.a.	Portugal
n.a.	n.a.	0.1	Romania
n.a.	n.a.	n.a.	San Marino
n.a.	n.a.	n.a.	Serbia
n.a.	n.a.	11.4	Slovakia
4.1	4.7	5.3	Slovenia
n.a.	n.a.	n.a.	Spain
n.a.	2.8	3.0	Sweden
n.a.	10.1	n.a.	Switzerland
n.a.	n.a.	n.a.	The former Yugoslav Republic of Macedonia
0.0	0.0	0.0	United Kingdom
n.a.	n.a.	n.a.	ECE Central
n.a.	n.a.	n.a.	Armenia
n.a.	n.a.	n.a.	Azerbaijan
n.a.	n.a.	n.a.	Georgia
n.a.	n.a.	n.a.	Israel
n.a.	n.a.	n.a.	Kazakhstan
n.a.	n.a.	n.a.	Kyrgyzstan
n.a.	n.a.	n.a.	Tajikistan
n.a.	n.a.	n.a.	Turkey
n.a.	n.a.	n.a.	Turkmenistan
n.a.	n.a.	n.a.	Uzbekistan
n.a.	n.a.	n.a.	ECE South-East
n.a.	n.a.	n.a.	Canada
n.a.	n.a.	n.a.	United States of America
n.a.	n.a.	n.a.	ECE West
n.a.	n.a.	n.a.	ECE Total
n.a.	n.a.	n.a.	EU-28

ANNEX 3: SOURCE DATA TABLES

Table 13d
Biological diversity

Country	Deadwood lying					
	Forest (m ³ /ha)			Other wooded land (m ³ /ha)		
	2000	2005	2010	2000	2005	2010
Belarus	0.8	0.3	0.4	0.9	0.4	0.4
Moldova	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Russian Federation	15.4	15.3	15.3	8.5	8.9	9.0
Ukraine	0.4	0.4	0.5	n.a.	n.a.	n.a.
ECE East	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Albania	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Andorra	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Austria	8.4	10.8	12.8	5.5	5.5	5.5
Belgium	4.3	4.1	4.4	n.a.	n.a.	n.a.
Bosnia and Herzegovina	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Bulgaria	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Croatia	8.0	8.0	8.0	n.a.	n.a.	n.a.
Cyprus	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Czech Republic	n.a.	6.8	6.8	0.0	0.0	0.0
Denmark	n.a.	2.5	1.5	n.a.	0.6	0.5
Estonia	4.0	5.6	6.9	0.4	1.3	2.2
Finland	4.3	4.0	4.0	0.6	0.8	1.2
France	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Germany	9.1	18.2	15.9	0.0	0.0	0.0
Greece	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Hungary	n.a.	n.a.	3.4	n.a.	n.a.	n.a.
Iceland	0.0	0.0	0.0	0.0	0.0	0.0
Ireland	n.a.	4.0	4.3	n.a.	n.a.	n.a.
Italy	3.3	3.4	3.6	n.a.	n.a.	n.a.
Latvia	n.a.	10.8	14.3	0.0	0.0	0.0
Liechtenstein	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Lithuania	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Luxembourg	7.2	7.1	7.1	n.a.	n.a.	n.a.
Malta	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Monaco	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Montenegro	2.8	2.8	3.5	0.3	0.3	0.1
Netherlands	4.1	5.2	6.2	0.0	0.0	0.0
Norway	4.5	n.a.	6.0	n.a.	n.a.	n.a.
Poland	n.a.	n.a.	3.1	n.a.	n.a.	n.a.
Portugal	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Romania	n.a.	n.a.	12.4	n.a.	n.a.	2.2
San Marino	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Serbia	1.2	1.2	1.2	6.4	5.3	5.3
Slovakia	n.a.	n.a.	28.2	n.a.	n.a.	12.8
Slovenia	10.7	12.2	12.7	2.4	2.4	2.4
Spain	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sweden	n.a.	4.6	4.7	n.a.	0.6	0.7
Switzerland	6.8	9.2	11.5	1.8	1.4	0.9
The former Yugoslav Republic of Macedonia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
United Kingdom	3.1	3.1	3.1	0.0	0.0	0.0
ECE Central	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Armenia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Azerbaijan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Georgia	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Israel	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kazakhstan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kyrgyzstan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Tajikistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Turkey	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Turkmenistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Uzbekistan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE South-East	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Canada	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
United States of America	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE West	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
ECE Total	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
EU-28	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Data sources: FAO/FRA (2000, 2005, 2010). Joint FOREST EUROPE/UNECE/FAO pan-European reporting (2011, 2014), national contacts and sources, secretariat's estimates - for more detailed information about sources of data and methods of estimation see web-based version.

Deadwood lying			Country
Total forest and other wooded land (m ³ /ha)			
2000	2005	2010	
3.3	1.8	2.0	Belarus
n.a.	n.a.	n.a.	Moldova
25.6	25.7	25.9	Russian Federation
n.a.	n.a.	n.a.	Ukraine
n.a.	n.a.	n.a.	ECE East
n.a.	n.a.	n.a.	Albania
n.a.	n.a.	n.a.	Andorra
8.4	10.8	12.8	Austria
4.3	4.1	4.4	Belgium
n.a.	n.a.	n.a.	Bosnia and Herzegovina
n.a.	n.a.	n.a.	Bulgaria
8.0	8.0	8.0	Croatia
n.a.	n.a.	n.a.	Cyprus
n.a.	6.8	6.8	Czech Republic
n.a.	2.5	1.5	Denmark
10.3	13.3	15.7	Estonia
1.1	3.9	3.9	Finland
n.a.	n.a.	n.a.	France
11.5	18.2	15.9	Germany
n.a.	n.a.	n.a.	Greece
n.a.	n.a.	3.4	Hungary
0.0	0.0	0.0	Iceland
n.a.	n.a.	n.a.	Ireland
n.a.	n.a.	n.a.	Italy
n.a.	17.7	23.6	Latvia
n.a.	n.a.	n.a.	Liechtenstein
n.a.	n.a.	n.a.	Lithuania
7.2	7.1	7.1	Luxembourg
n.a.	n.a.	n.a.	Malta
n.a.	n.a.	n.a.	Monaco
4.5	4.5	5.7	Montenegro
4.1	5.2	6.2	Netherlands
n.a.	n.a.	n.a.	Norway
n.a.	n.a.	n.a.	Poland
n.a.	n.a.	n.a.	Portugal
n.a.	n.a.	14.6	Romania
n.a.	n.a.	n.a.	San Marino
1.2	1.2	1.2	Serbia
n.a.	n.a.	26.3	Slovakia
10.5	12.0	13.6	Slovenia
n.a.	n.a.	n.a.	Spain
n.a.	4.4	4.5	Sweden
n.a.	7.0	n.a.	Switzerland
n.a.	n.a.	n.a.	The former Yugoslav Republic of Macedonia
0.0	0.0	0.0	United Kingdom
n.a.	n.a.	n.a.	ECE Central
n.a.	n.a.	n.a.	Armenia
n.a.	n.a.	n.a.	Azerbaijan
n.a.	n.a.	n.a.	Georgia
n.a.	n.a.	n.a.	Israel
n.a.	n.a.	n.a.	Kazakhstan
n.a.	n.a.	n.a.	Kyrgyzstan
n.a.	n.a.	n.a.	Tajikistan
n.a.	n.a.	n.a.	Turkey
n.a.	n.a.	n.a.	Turkmenistan
n.a.	n.a.	n.a.	Uzbekistan
n.a.	n.a.	n.a.	ECE South-East
n.a.	n.a.	n.a.	Canada
n.a.	n.a.	n.a.	United States of America
n.a.	n.a.	n.a.	ECE West
n.a.	n.a.	n.a.	ECE Total
n.a.	n.a.	n.a.	EU-28



ANNEX 3: SOURCE DATA TABLES

Table 14
Certification

Country	Certified areas (1,000 ha)			
	FSC 2007	FSC 2014	PEFC 2007	PEFC 2014
Belarus	2,502	4,901	0	8,256
Moldova	0	0	0	0
Russian Federation	15,521	38,433	0	2,758
Ukraine	1,409	1,410	0	0
ECE East	19,431	44,745	0	11,014
Albania	0	0	0	0
Andorra	0	0	0	0
Austria	5	1	3,960	2,782
Belgium	11	23	255	299
Bosnia and Herzegovina	62	1,519	0	0
Bulgaria	22	410	0	0
Croatia	1,322	1,320	0	0
Cyprus	0	0	0	0
Czech Republic	15	50	1,976	1,845
Denmark	188	200	205	253
Estonia	1	1,177	0	1,836
Finland	434	482	22,144	20,620
France	16	19	4,577	5,568
Germany	478	972	7,186	7,361
Greece	32	0	0	0
Hungary	196	321	0	0
Iceland	0	0	0	0
Ireland	0	447	0	376
Italy	20	51	652	725
Latvia	1,629	1,749	38	1,684
Liechtenstein	0	0	0	0
Lithuania	1,042	1,066	0	0
Luxembourg	11	21	24	31
Malta	0	0	0	0
Monaco	0	0	0	0
Montenegro	0	0	0	0
Netherlands	100	169	0	0
Norway	0	351	8,478	9,126
Poland	6,900	6,920	0	7,287
Portugal	24	340	0	250
Romania	1,093	2,440	0	0
San Marino	0	0	0	0
Serbia	40	1,018	0	0
Slovakia	159	142	537	1,243
Slovenia	271	250	0	10
Spain	132	194	1,048	1,739
Sweden	11,234	12,063	7,048	9,813
Switzerland	674	814	453	206
The former Yugoslav Republic of Macedonia	0	0	0	0
United Kingdom	1,273	1,377	0	1,352
ECE Central	27,382	35,906	58,581	74,407
Armenia	0	0	0	0
Azerbaijan	0	0	0	0
Georgia	0	0	0	0
Israel	0	0	0	0
Kazakhstan	0	0	0	0
Kyrgyzstan	0	0	0	0
Tajikistan	0	0	0	0
Turkey	0	2,389	0	0
Turkmenistan	0	0	0	0
Uzbekistan	0	0	0	0
ECE South-East	0	2,389	0	0
Canada	24,353	54,804	39,139	116,237
United States of America	9,082	15,721	29,936	29,936
ECE West	33,435	70,525	69,075	146,172
ECE Total	80,248	153,565	127,656	231,593
EU-28	26,605	32,203	49,650	65,075

Data sources: PEFC and FSC 2014 - for more detailed information about sources of data and methods of estimation see web-based version.

Number Chain of Custody certificates				Country
FSC 2006	FSC 2014	PEFC 2006	PEFC 2014	
2	0	0	88	Belarus
0	0	0		Moldova
32	259	0	14	Russian Federation
1	0	0	1	Ukraine
35	259	0	103	ECE East
0	0	0	0	Albania
0	0	0	0	Andorra
41	244	279	442	Austria
84	705	66	439	Belgium
0	250	0	1	Bosnia and Herzegovina
2	59	0	2	Bulgaria
44	207	0	0	Croatia
0	10	0	0	Cyprus
20	161	250	159	Czech Republic
63	249	10	76	Denmark
28	176	0	31	Estonia
12	97	109	201	Finland
116	822	921	2,084	France
390	2,114	602	1,550	Germany
0	13	0	0	Greece
11	115	2	17	Hungary
0	0	0	0	Iceland
20	92	0	35	Ireland
156	1,783	35	685	Italy
90	216	14	30	Latvia
2	5	0	0	Liechtenstein
26	179	0	7	Lithuania
5	16	0	16	Luxembourg
0	9	0	0	Malta
0	2	0	0	Monaco
0	0	0	0	Montenegro
316	1,352	18	495	Netherlands
9	41	6	47	Norway
343	1,168	0	119	Poland
9	148	1	76	Portugal
24	259		20	Romania
0	3	0	0	San Marino
	103	0	0	Serbia
19	110	0	53	Slovakia
20	162	0	13	Slovenia
53	631	48	636	Spain
106	288	65	142	Sweden
269	510	1	64	Switzerland
0	2	0	0	The former Yugoslav Republic of Macedonia
559	2,357	208	1,164	United Kingdom
2,837	14,658	2,635	8,604	ECE Central
0	0	0	0	Armenia
0	0	0	0	Azerbaijan
0	0	0	0	Georgia
0	10	0	5	Israel
0	0	0	0	Kazakhstan
0	0	0	0	Kyrgyzstan
0	0	0	0	Tajikistan
0	171	0	0	Turkey
0	0	0	0	Turkmenistan
0	0	0	0	Uzbekistan
	181		5	ECE South-East
126	911	48	162	Canada
521	3,149	0	253	United States of America
647	4,060	48	415	ECE West
3,519	19,158	2,683	9,127	ECE Total
2,557	13,742	2,628	8,492	EU-28



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Forests in the ECE Region

Trends and Challenges in Achieving
the Global Objectives on Forests

This Study is a contribution of the ECE Region to the Eleventh Session of the United Nations Forum on Forests. Using the best available data, it examines progress of the forest sector in the ECE Region towards the achievement of the four Global Objectives on Forests, adopted by the United Nations General Assembly in 2007. On the basis of this assessment as well as the forest sector outlooks and policy commitments by ECE member States, thirteen major challenges for the forest sector in the region are identified and analysed. The study provides policy recommendations for consideration in the discussions by UNFF.



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