



RESEARCH ON

Forests



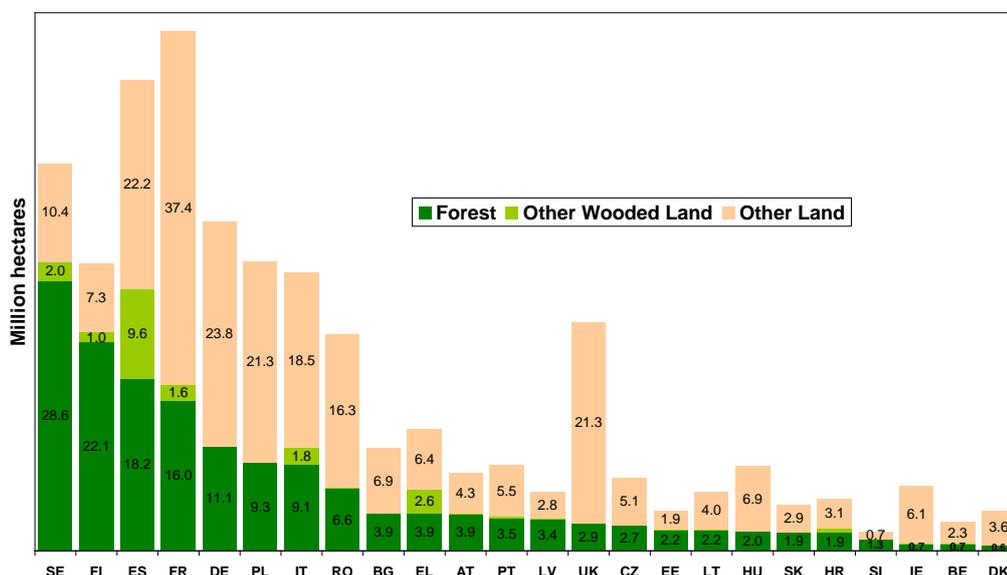
EU forests have been expanding, gaining around 11 million hectares between 1990 and 2010. They cover 159 million hectares, or 38% of the EU-28's total land area (179 million hectares or 42% when taking into account "other wooded land", see the statistical snapshot). Moreover, around 60% are privately owned. Forests represent invaluable ecosystems; their diversity mirrors the EU's natural conditions, from boreal forests in the North to coniferous forests of the Mediterranean in the South. They are faced with a wide range of threats, whether biotic (e.g. fungi) or abiotic (e.g. fires); these perils are reinforced by the speed of climate change, which is already affecting them. In addition, the "multifunctional role" of forests is often put forward: environmental (e.g. they protect soils), economic (e.g. they are the basis of wood industries) and social (e.g. they are the place of a variety of recreation activities).

EU forest-related policies

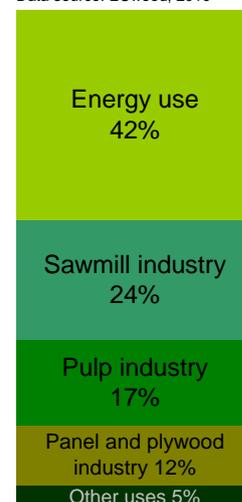
The EU Treaties do not foresee a Common Forestry Policy; forest policy remains a competence of EU Member States. In this context, the framework for forest-related actions in the EU has consisted of a Council Resolution on a [EU Forestry Strategy](#) (adopted in 1998) and an [EU Forest Action Plan](#) (2006), aiming at coordinating national, EU and other international forest-related actions. On 20 September 2013, the European Commission published a new EU Forest Strategy, updating this framework ([COM\(2013\)659](#), [SWD\(2013\)342](#)). Furthermore, negotiations on a wide-ranging [Legally Binding Agreement on Forests in Europe](#) are on-going, under the Ministerial Conference on the Protection of Forests in Europe ("Forest Europe"), to which the EU and its Member States are signatories.

In addition, **a wide range of EU policies affect forests**, not only in the EU but also in third countries, either **directly** (e.g. through the financing of afforestation of agricultural land under the Common Agricultural Policy) or **indirectly** (e.g. through the setting of mandatory national targets for the use of energy from renewable sources). The main EU policies affecting forests relate to areas such as agriculture (rural development, under the Common Agricultural Policy), plant health and protection, environment, climate, energy, industry, research, civil protection, regional policy, development cooperation and trade. Moreover, a number of **policy processes at international level** set out the framework under which forest policies are designed in the EU (e.g. as mentioned earlier, Forest Europe, or the United Nations Framework Convention on Climate Change).

Statistical Snapshot



Wood resources use in the EU-27. % of volumes.
Data source: EUwood, 2010



Key Overviews and Statistics

[State of Mediterranean Forests - First Edition](#) / FAO, 191 p., 2013. Also available in [French](#).

This document reviews the situation of Mediterranean forests. Forest ecosystems and other wooded lands are an important component of landscapes in the Mediterranean region, contributing to rural development, poverty alleviation and food security. They are crucial for many of the region's economic sectors, such as food supply, agriculture, soil and water conservation, drinking water supply, tourism and energy. Global changes strongly affect the Mediterranean region. If unmanaged, such changes could lead to the loss of biodiversity, an increased risk of wildfire, the degradation of watersheds, and desertification, with serious consequences for the sustainable provision of forest goods and ecosystem services.

[State of the World's Forests 2012](#) / FAO, 60 p., 2012. Also available in [French](#) and in [Spanish](#). See also: [FAOSTAT Forestry database](#).

This report analyses the status of forests, major policy and institutional developments, as well as key issues concerning the forest sector. It focuses on the critical role of forests, forestry and forest products in the transition to a sustainable global economy: as the world looks for ways to ensure a sustainable future, it is increasingly apparent that forests, forestry and forest products must play a central role in this transition. The report concludes with a comprehensive analysis of this process, including suggestions for future strategies for consideration by leaders inside and outside the forest sector at the local, national and global levels.

[State of Europe's Forests 2011](#) / Forest Europe, UNECE and FAO, 344 p., 2011. See also: [Summary for Policy Makers](#); [data in Excel Format](#); [definitions of the concepts](#).

This report provides a comprehensive description of the status and trends of forests and forest management in Europe. It presents a wide range of harmonised data. Forest Europe is the pan-European policy process for the sustainable management of Europe's forests. It develops common strategies for its 46 member countries and the EU, on how to protect and sustainably manage forests.

[Forestry in the EU and the World](#) / Eurostat, 116 p., 2011.

This publication statistically depicts forests in their various dimensions. Forests have a variety of ecological functions, serving as habitats for plant and animal species, helping to protect water and soil resources, as well as contributing to the fight against climate change. On the other hand, forests are an important economic factor as suppliers of wood and other forest products. Forests and other wooded land cover more than 40 % of the EU's land area, and the EU is set apart from many other global regions insofar as it is one of the few regions of the world where forest area is currently expanding. This publication presents information for the EU and its Member States, as well as comparisons with countries that have considerable forest resources.

[Global Forest Resources Assessment 2010 - Main Report](#) / FAO, 378 p. 2010. Also available in [French](#) and in [Spanish](#). Key findings, country reports, global tables and access to the database can be found on this [page](#).

This publication examines the status and recent trends for about 90 variables covering the extent, condition, uses and values of forests and other wooded land, with the aim of assessing all benefits from forest resources. Information has been collated from 233 countries and territories for four points in time: 1990, 2000, 2005 and 2010. Organized according to the seven thematic elements of sustainable forest management, the report contains information to monitor progress towards international goals and targets. It also includes information on forest health, the contribution of forests to national economies and the legal and institutional framework governing the management and use of the world's forests.

[Vital Forest Graphics](#) / UNEP, FAO and United Nations Forum on Forests, 75 p., 2009.

Forests often are at the nexus of the most pressing issues high on the global environmental and sustainable development agenda, namely: climate change, biodiversity loss, poverty eradication, ecosystem management, and environmental governance. This report analyses, synthesizes and illustrates topical forest issues. It is intended to serve as an advocacy tool to promote conservation and sustainable management of the world's forests through a better and wider understanding of the critical values they provide in support of global ecological stability, economic development and human well-being.

Forests and the Common Agricultural Policy (CAP)

[Support for the Improvement of the Economic Value of Forests from the European Agricultural Fund for Rural Development](#) / European Court of Auditors, Special Report No 8/2013, 60 p. Available in all EU languages through the Official Journal of the EU (2013/C 272/08).

The main objective of the audit was to assess whether rural development support for the improvement of the economic value of forests is managed efficiently and effectively. In doing so the Court assessed (a) whether the design of the measure is adequate, (b) whether the implementation process is appropriate and (c) whether the assessment of the effectiveness of the measure is satisfactory.

[Rural Development in the EU. Statistical and Economic Information Report 2012](#) / European Commission, 378 p., 2012.

This annual report provides, at national and regional levels, statistical and economic information covering the three objectives of Rural Development policy 2007-2013. Several sections are dedicated to forestry. Moreover, the financial plans per Member State and at EU level for the current programming period are available (page 318 and following pages).

[Forestry Measures in the 2007-2013 Rural Development Programmes](#) / National Rural Networks Joint Thematic Initiative on Forestry, 45 p., 2010. See also the website of the [National Rural Network \(NRN\) Forestry Thematic Initiative](#).

The paper describes the forestry sector at EU level and in the countries involved in the NRN Forestry thematic initiative (11 Member States: Austria, Belgium, Estonia, Finland, Germany, Italy, Latvia, Romania, Spain, Sweden and United Kingdom). It also provides a short overview of EAFRD forestry measures at EU level, and then a more detailed consideration of each of the forestry measures, using examples from selected Rural Development Programmes. A final section shows how some Member States use additional EAFRD funding for the period 2010-13 to focus on the 'new challenges' of the CAP Health Check (particularly climate change). State aid rules for forestry are also commented.

[Report on the Implementation of Forestry Measures under the Rural Development Regulation 1698/2005 for the Period 2007-2013](#) / European Commission, 73 p., 2009.

The report provides an overview of forestry measures included in the Rural Development programmes of the Member States for the period 2007-2013, based on the programmes adopted by the Commission by mid-2008 at the latest. It has been prepared within the framework of the work programme for implementation of the EU Forest Action Plan (2007-2011).

[Opinion on Forestry Measures in Rural Development](#) / Standing Forestry Committee, 5 p., 2009.

The Commission report describing the uptake and application of forestry measures in the Rural Development programmes for the period 2007-2013, and the consequent discussions of the Standing Forestry Committee, revealed difficulties in the implementation of some forestry-related measures and the need to consider possibilities to simplify and clarify the regulatory framework. This opinion is a contribution to the preparation of the regulatory framework for the next programming period as well as the preparation of the review of CAP post-2013.

[Forestry Measures Within Rural Development Policy](#) / European Court of Auditors Special Report No 9/2004, 28 p., 2004. Available in all EU languages through the Official Journal of the EU (2005/C 67/01).

The Court's audit determined whether the forestry measures were based on forestry plans or equivalent instruments; how such measures were programmed and financed; how they were implemented and what their impact was. Audit visits were carried out at the Commission and in the main recipient Member States (Spain, Portugal, Italy, Ireland and France). A sample of projects, selected on the basis of their financial importance and representativeness, were visited on the spot. Annex I summarises the main forestry actions carried out between 1964 and 1999.

EU Forestry-Related Actions

[The EU and Forests](#) / Ragonnaud, European Parliament Fact Sheet, 4 p., 2013. Available in all EU languages (Original language: French).

European Parliament fact sheets give an overview of the EU, how it operates and what policy areas it covers. They are aimed at non-specialists and are regularly updated.

[The Contribution of European Forest-Related Policies to Climate Change Mitigation: Energy Substitution First](#) / Baron et al., Caisse des Dépôts Research, 44 p., 2013.

In a framework where no common forestry policy exists at the EU level, this report lists EU policies that have an impact on climate change mitigation that can be achieved by the forestry sector. With the objective of analyzing the coherence of these policies, the report establishes a typology and a hierarchy firstly by laying out the legal status and the financial and institutional resources associated with each policy, and secondly by reviewing the objectives of each policy as regards climate change mitigation in the forestry sector. Finally, it analyzes potentials synergies and conflicts between them.

[Evaluation of the EU Forest Action Plan \(FAP\)](#) / European Forest Institute, Forest Science Center of Catalonia, Institute for European Environmental Policy, 145 p., 2012.

The objectives of this report are to provide a review of the implementation, effectiveness and appropriateness of the FAP; to analyse whether the objectives of the FAP have been met, the Action Plan has led to any side effects, the instruments used have been appropriate, relevant, effective and efficient, and to assess the role of the key actors, and to examine if the FAP was the most suitable framework for forest-related actions and instruments of coordination between the EU and Member States.

[Report to the Standing Forestry Committee Contributing to the Development of a New EU Forest Strategy](#) / Standing Forestry Committee ad hoc Working Group VII, 45 p., 2012.

Unless significant emerging issues, and new challenges as well as a stronger implementation component are considered and addressed, the 1998 EU Forestry Strategy risks losing its relevance as a key reference for policy development related to forests in the EU. The Standing Forestry Committee represents forestry administrations of the Member States. The European Commission is the chairperson of the Committee.

[EU Policy Options for the Protection of European Forests Against Harmful Impacts](#) / Winkel et al., Albert-Ludwigs-University Freiburg - Institute of Forest and Environmental Policy, and Ecologic Institute Berlin, 146 p., 2009.

The first part of this report provides an overview of the current state of European forests, as well as relevant threats and challenges regarding European forestry and forest protection. It further discusses existing forest and forest-related policies across the EU. Based on both analyses, need for action is identified. The second part develops and evaluates policy concepts to respond to these needs. Finally, scenarios towards better forest protection at the EU level and recommendations for the implementation are provided.

Forest Governance

[Moving Forward With Forest Governance](#) / Broekhoven et al. (eds), European Tropical Forest Research Network, Tropenbos International, 292 p., 2012.

The need to improve forest governance is widely acknowledged, but difficult to achieve due to divergent interests and mind-sets and unequal power relations. Improving the quality and accessibility of information is often considered an important first step towards improved forest governance. The 29 articles in this report showcase a rich diversity of examples of how different aspects of forest governance have been addressed in various settings (e.g. community forestry; international instruments — such as FLEGT, forest certification, REDD+).

[Challenges to the Legitimacy of Private Forest Governance – the Development of Forest Certification in Sweden](#) / Johansson, Environmental Policy and Governance Env. Pol. Gov. 22, 424–436, 2012. Accessible through the European Parliament's intranet (EP Library). Click on IP authentication for full text access.

Substantial attention has been given to the effectiveness and legitimacy of private forest governance, especially the Forest Stewardship Council (FSC). Research has suggested that such cooperation between forest corporations and NGOs may develop shared norms for responsible forestry. At least initially, however, conflicts are likely to occur since these stakeholders are accountable to different constituencies. This study explores how stakeholders' search for

accountability has influenced the legitimacy of forest certification schemes, drawing on developments in Sweden.

[Embracing Complexity: Meeting the Challenges of International Forest Governance. A Global Assessment Report](#) / International Union of Forest Research Organizations, 172 p., 2010. Policy briefs for policy and decision makers are available in [English](#), [French](#), and [Spanish](#).

This report provides an overview of the complex and diverse elements that currently make up the global forest governance arrangements and identifies and analyses the core components of these arrangements. It also proposes options for dealing with complexity and improving the effective implementation of forest governance at global, regional, national and sub-national levels.

Forest Ownership

[Mapping the Distribution of Forest Ownership in Europe](#) / Pulla et al., European Forest Institute, 91 p., 2013.

This study aims to provide an overview of the patterns of forest ownership and to examine differences in the location within countries and between different parts of Europe. Private forestry owners play a key role in sustaining forest ecosystems, biodiversity protection, climate change mitigation, policies in enhancing rural development (e.g. for the EU: CAP) and for supplying timber resources as well as other goods and services to markets.

[Private Forest Ownership in Europe](#) / UNECE, FAO, 120 p., 2010.

More than half of Europe's forests, not including Russia and other countries from the Commonwealth of Independent States are privately owned. Private owners play a key role in sustaining forest ecosystems, enhancing rural development and supplying resources to markets. This paper presents the main findings from the national country reports and draws conclusions on the state of private forestry in Europe in terms of ownership distribution, holding structure, socio-economic findings and trends, with regard to restitution/privatization, changes of ownership patterns and association of private forest owners.

Forest Products

[Forest Products Annual Market Review, 2011-2012](#) / UNECE-FAO, 178 p., 2012.

This review offers a comprehensive analysis of the year's forest products markets and policies for the UNECE region (Europe, North America and the Commonwealth of Independent States). It focuses on the various sectors of the industry, presenting market data along with the policy and economic factors lying behind the data, and analysing the most recent market changes. Industrial roundwood production increased for the second year in a row, climbing by 2.4% over 2010, with harvests as much as 12% more than the lows of 2009, but still down 14% from 2007.

[Global Forest Products Facts and Figures 2011](#) / FAO, 17 p., 2011.

This note presents highlights and recent trends for the different forest product groups. The recent economic recession appears very clearly in the statistics for the last five years, but has affected markets and regions differently. Most of the impact of the recession was felt in Europe and North America. China continues to increase in importance as a producer and consumer of forest products and has overtaken a number of other major countries in different product groups (e.g. Canada in sawnwood production). China is also highly significant for international trade in forest products. The structure of production and trade in Russian Federation has also changed in the last five years, with a decline in industrial roundwood exports and increases in sawnwood production and exports. Production and consumption of wood-based panels appears to be growing relatively strongly in most regions. In the markets for pulp and paper, overall growth was very modest over the period 2007-11. However, this conceals major differences at the regional level, where pulp and paper production and consumption is increasing significantly in the Asia-Pacific region, but generally declining in Europe and North America.

[Real Potential for Changes in Growth and Use of EU forests - EUwood](#) / University of Hamburg, UNECE, European Forest Institute, Probos, METLA, 160 p., 2009.

The EUwood project provides a precise overview on future wood supply and demand. It brings together data and analyses from a wide range of sources in the comprehensive and structured

framework of the Wood Resource Balance. Furthermore, it offers a detailed and transparent estimate of future potential wood supply in Europe.

Forest and the Economy

[Forests and Economic Development, a Driver for the Green Economy in the ECE Region / UNECE, FAO, 68 p., 2013.](#)

The study reviews the ways in which forests contribute to economic development in the ECE region (i.e. a region comprising 56 countries, located in the EU, non-EU Western and Eastern Europe, South-East Europe and Commonwealth of Independent States and North America). Although its weight in the GDP is relatively modest, the forests' contribution to economic development remains significant, with potential for development especially in the context of a Green Economy. The study analyses the outlook and main challenges for the forest sector in the region: wood energy, sustainability of wood supply, the forest sector workforce, payment for forest ecosystem services, innovation, demonstrating and communicating the sustainability of forest management.

[Good Business Making Private Investments Work for Tropical Forests / Asen et al. \(eds\), European Tropical Forest Research Network, Tropenbos International, 220 p., 2012.](#)

Private finance is currently the most significant source of investment for forestry. Estimated to total around US \$15 billion per year in developing countries and countries in transition, private-sector investment in the forestry sector far outstrips the combined investments of governments and development agencies. With growing needs for forest products, there is increasing agreement that there is a significant gap between the levels of financing which are available from both public and private sources and the funding required to meet expected future demands. A crucial challenge for policymakers will be to somehow reorient, increase and incentivize private finance to make it flow in adequate amounts towards sustainable, environmentally sound, and competitive forest management practices that can support responsible and profitable forest entrepreneurship. This report brings together 23 articles that present and analyze concrete examples of various private actors along the tropical forest-finance chain (small, medium and large forest entrepreneurs and intermediary and advisory organizations).

[Bio-Economy Versus Biodiversity / Hall et al., Global Forest Coalition, 18 p., 2012.](#)

As part of the green economy approach, there is now a proposal to develop a "post-fossil fuel" bioeconomy, championed by the EU, the United States and Brazil in particular. This bio-economy approach is heavily based on the use of biomass, both as a fuel and as a raw material from which to manufacture a wide range of products, including plastics and chemicals. This will be made possible courtesy of a range of technologies including genetic manipulation, nanotechnology and synthetic biology. This report develops the idea that using renewable resources instead of fossil fuels is a good idea in theory, but that the way in which the bio-economy approach proposes to achieve this goal is at best deeply flawed and inequitable, and at worst dangerous.

[Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication - Chapter on Forests / UNEP, 44 p., 2011.](#)

Forests are a foundation of the green economy, sustaining a wide range of sectors and livelihoods. Short-term liquidation of forest assets for limited private gains threatens this foundation and needs to be halted. International and national negotiations of a REDD+ regime may be the best opportunity to protect forests and ensure their contribution to a green economy. Tried and tested economic mechanisms and markets exist which can be replicated and scaled up. Investments in natural forests and plantations can deliver economic benefits. Legal and governance changes are needed to tip the balance towards sustainable forestry, which is not yet at scale, and away from unsustainable practice, which is entrenched in both the forest sector and competing sectors.

[Reference Futures and Scenarios for the European Forestry-Wood Chains Source Databases / European Forest Institute Technical Report 85, 36 p., 2011.](#)

This report is a deliverable from the EU FP6 Integrated Project EFORWOOD – Tools for Sustainability Impact Assessment of the Forestry-Wood Chain. The main objective of EFORWOOD was to develop a tool for Sustainability Impact Assessment of Forestry-Wood Chains (FWC) at various scales of geographic area and time perspective. A FWC is determined by economic, ecological, technical, political and social factors, and consists of a number of interconnected

processes, from forest regeneration to the end-of-life scenarios of wood-based products. EFORWOOD produced, as an output, a tool, which allows for analysis of sustainability impacts of existing and future FWCs.

[Payments for Forest-Related Ecosystem Services: What Role for a Green Economy?](#) / UNECE, FA, 46 p., 2011.

This paper outlines the concept of ecosystems and ecosystem services and of a green economy. It presents a compilation of case studies from across the UNECE region, and discusses enabling conditions for payments for ecosystem services.

Wood Energy

[The State of Renewable Energies in Europe](#) / 12th EurObserv'ER Report, 123 p., 2013.

This publication provides a complete overview of ten renewable energy sectors in the EU. The winter of 2011 was exceptionally mild, even in Northern Europe. As a result the demand for firewood and solid biomass fuel was low. The EU's primary energy production from solid biomass between 2010 and 2011 contracted by 2.2% and slipped to 78.9 Million Tonnes of Oil Equivalent (Mtoe). Gross consumption of solid biomass primary energy, including imports and exports, is put at 81.1 Mtoe in 2011, a drop of 3.0%. The main reason for this difference is increasing influx of wood pellets imported into the EU from Canada and the United States, which amounted to more than 2 million tonnes in 2011.

[Wood Energy: Opportunity or Risk?](#) / FAO, UNECE Policy Brief, 4 p., 2012.

This Policy Brief summarises the views and recommendations of the various stakeholders that participated in a policy debate organised by the UNECE/FAO Forestry & Timber Section, held in Geneva on 8 May 2012. The objective of the policy debate was to provide policymakers with a set of views from a wide group of involved sectors to address the economic, environmental and social aspects of the growing demand for and use of wood for energy.

[Renewable Energy Projections as Published in the National Renewable Energy Action Plans \(NREAPs\) of the European Member States - Main Report](#) / Energy research Centre of the Netherlands, 270 p., 2011. Data can be found on this [page](#).

As defined in Article 4 of the European Renewable Energy Directive (2009/28/EC), each EU Member State has provided a NREAP to the European Commission, detailing projections for renewable energy development up to the year 2020. By that year, the cumulative consumption of renewable energy in all European Member States should result in an overall share of renewable energy of 20% across the EU. The Energy research Centre of the Netherlands, assigned by the European Environment Agency, has collected all energy-related data in this report.

[Good Practice Guidance on the Sustainable Mobilisation of Wood in Europe](#) / Forest Europe, European Commission, UNECE, FAO, 39 p., 2010.

This document is intended to provide guidance for sustainable mobilisation of wood in Europe. The guidance refers to good practice examples of successful and sustainable mobilisation of wood, to assist policy-makers and practitioners alike in taking and supporting similar measures.

Prospective Analyses

EUROPE

[Vision 2030 for the European Forest-based Sector](#) / Forest-based Sector Technology Platform, 12 p., 2013.

The vision can be summarised in three statements: the forest-based sector is a key actor in and enabler of the biobased society; consumer needs and the smart and sustainable use of forest resources are the cornerstones of development in the sector; the sector is bustling with new entrepreneurial activities that create employment and enrich the rural economy. The new targets for 2030 form the backbone of this document.

[The European Forest Sector Outlook Study II - 2010-2030](#) / UNECE-FAO, 111 p., 2012.

Expectations of the region's forests to meet increasing environmental, social and economic demands have never been higher. European forest sector policy makers must grapple with complex, imperfectly understood challenges to meet these demands when designing forest

policies. This study provides policy makers and other actors with objective analysis on which they can base their choices. It focuses on seven major challenges, which could all have significant consequences and could interact with each other. They are complex, international, and long term in nature: mitigating climate change, supplying renewable energy, adapting to climate change and protecting forests, protecting and enhancing biodiversity, supplying competitive and renewable forest products, achieving and demonstrating sustainability, and developing appropriate policies and institutions.

THIRD COUNTRIES

[The North American Forest Sector Outlook Study 2006-2030](#) / UNECE, FAO, 68p., 2012.

This report seeks to describe the recent history and projected futures of forest area, timber stocks (the volume of standing live timber inventory), production, consumption, trade, and prices across multiple categories of forest products.. Projections show, in particular, that forest area in both countries does not significantly change from 2006 to 2030, but that timber stocks accumulate in both countries, slightly for Canada (less than 2% increase to 2030) and more in the United States (9% or 10%).

[The Russian Federation Forest Sector Outlook Study to 2030](#) / FAO, 68 p., 2012.

This report presents an independent expert evaluation of the current state of the forest sector in the Russian Federation and possible alternatives for its development to the year 2030. It analyses the main systemic problems of the forest sector in the country and offers potential solutions and has been designed to aid policy-makers in developing and implementing informative decisions. It aims to increase the openness, transparency and investment attractiveness of the Russian forest sector for national and international investors. The last two decades of active Russian political and economic reforms have shown the forest sector of the country to be comparatively slow in adapting to market relations and requirements. The forest sector is not a priority of national forest policy. Russia accounts for over 20% of the world forests, but its share in the world forest products trade is below 4%. Semi-processed roundwood and sawnwood make up over 54% of its exported wood products. Forests occupy over half of the land of the country, but the share of the forest sector in the GDP is only 1.3%; in industrial production, 3.7%; in employment, 1%; and in export, revenue 2.4%. These facts prove that the colossal forest potential of the country is essentially under-utilised. The opportunities presented by the forest sector are clearly underestimated by state economic policy and policy-makers.

Forests and Climate Change

[Adapting to climate change in European forests - Results of the MOTIVE project](#) / Fitzgerald *et al.*, 110 p., 2013.

Climate change is posing a major challenge to forestry across Europe. These changing environmental conditions affect tree growth and productivity of forests. Past experiences regarding the local and site-specific suitability of species are no longer valid and this calls for an adaptation of present forest management strategies. The work of MOTIVE focused on regional case studies, which were implemented in a participatory process with local stakeholders. The document presents these case studies together with a series of articles that address important aspects of climate change impacts and adaptive forest management.

[Climate Change in European Forests: How to Adapt](#) / European Forest Institute Policy Brief N°9, Fitzgerald *et al.*, 16 p., 2013.

This brief describes proactive and reactive management styles and illustrates how they have been used in different regions of Europe. The case study areas are selected from those of an EU-funded research project MOTIVE (Models for Adaptive Forest Management). Accounting for climate change in forest management is a challenge for many forest managers, owners and decision makers around Europe. In order to make timely decisions, they need solid information on e.g. climate change projections and uncertainties, forest health, pests and diseases, tools for running different forest management scenarios as well as information on successful adaptation measures in their regions.

[Climate Change May Cause Severe Loss in the Economic Value of European Forest Land](#) / Hanewinkel *et al.*, *Nature Climate Change*, Volume 3, 2013. Full text can be requested to the EP Library.

European forests are to a large extent intensively managed and support an important timber industry. Climate change is expected to strongly affect tree species distribution within these forests. Climate and land use are undergoing rapid changes at present, with initial range shifts already visible. However, discussions on the consequences of biome shifts have concentrated on ecological issues. The article shows that forecasted changes in temperature and precipitation may have severe economic consequences. On the basis of the model results, the expected value of European forest land will decrease owing to the decline of economically valuable species in the absence of effective countermeasures.

[A European Map of Living Forest Biomass and Carbon Stock: Executive Report](#) / Barredo, Joint Research Centre, 16 p., 2012.

Forest ecosystems have a key role in the global carbon cycle and are considered large and persistent carbon sinks. The CO₂ fixed by photosynthesis is one of the most important components of the carbon cycle, and forests play a determinant role in this process. Therefore, spatially explicit data and assessments of forest biomass and carbon is of paramount importance for the design and implementation of effective sustainable forest management options and forest-related policies at the European level. This report presents European-wide maps of forest biomass and carbon stock at IPCC Tier 1 level.

[Climate Change Impacts and Adaptation in Europe's Forests](#) / European Forest Institute Policy Brief N°6, 16 p., 2011.

This brief highlights that climate change is already affecting European forests. Growth rates have increased in Northern latitudes, while some species have declined on dry sites close to their Southern distribution limits. Also, the recent increases in abiotic and biotic disturbances can at least partly be attributed to climate change.

[Adapting Forests and Their Management to Climate Change: An Overview](#) / Bernier and Schoene, in *Unasylva* N°231/232, 7 p., 2009.

The health of many forest ecosystems is already affected by climate change, and the impact is likely to accelerate, with local and global negative consequences that will likely outweigh growth increases linked to climate change. Adaptation is possible, but it is essential to plan and act soon to avert the most detrimental impacts and capture the opportunities. Awareness of actual and potential impacts from climate change, assessment of uncertainties and inclusion of risks should form the backbone of adaptation policies in forest management planning. The main challenge may be to promote planned adaptation in the absence of immediate crisis, especially when planned adaptation means reducing the potential long-term gains that would be realized in the absence of climate change. Reactive adaptation may be the most natural option but will hurt forests and society in the long term.

[Adaptation of Forests and People to Climate Change – A Global Assessment Report](#) / International Union of Forest Research Organisations, 224 p., 2009. A Policy brief concerning this report is available: [Making Forests Fit for Climate Change](#) (40 p., 2009). Also available in [French](#) and [Spanish](#).

Forest, and the goods and services they provide, are essential for human well-being. An assessment of the likely impacts of climate change on forests and forest-dependent people, therefore, is important for effective climate change adaptation. Such an assessment can also assist the development of options for avoiding the harmful effects of climate change and to take advantage of the opportunities provided by it. This report assesses the interrelations among forest ecosystems, the services they provide, and climate change the past and future impacts of climate change on forest ecosystems and the people that depend on these ecosystems management and policy options for adaptation.

[Forests and Climate Change: Adaptation and Mitigation](#) / Van Begodom *et al.* (Eds), European Tropical Forest Research Network, Tropenbos International, 180 p., 2009.

Forests contain a substantial part of the planet's carbon; therefore, current rates of forest loss contribute to almost 20% of total emissions of carbon dioxide. Climate change and forests are intrinsically linked: climate change is a threat to forests, and protecting forests from conversion

and degradation helps mitigate the impacts of climate change. This document gathers 20 wide-ranging articles on forests and climate change, including tropical forests.

[Impacts of Climate Change on European Forests and Options for Adaptation](#) / European Forestry Institute et al., 173 p., 2008.

This study compiles and summarizes the existing knowledge about observed and projected impacts of climate change on forests in Europe and reviews options for forests and forestry to adapt to climate change. Forests are particularly sensitive to climate change, because the long life-span of trees does not allow for rapid adaptation to environmental changes. Adaptation measures for forestry need to be planned well in advance.

[International Forest Policy: Integrated Climate and Forestry Policy Options](#). Brown et al., Overseas Development Institute, 146 p., 2008.

This report has been requested by the European Parliament Committee on Environment, Public Health and Food Safety, the Temporary Committee on Climate Change and the Committee on Development. It addresses the integrated climate and forestry policy options in developing countries, focussing on the implications of carbon financing for pro-poor community forestry. Specifically, it considers the implications of carbon financing for pro-poor community forestry, and responds to the following question: how do we design forest policy tools to jointly address climate change, environmental and development goals?

Other Environmental Issues

[Forests and Water](#) / FAO, 84 p., 2013

Forests play a crucial role in the hydrological cycle. they influence the amount of water available and regulate surface and groundwater flows while maintaining water quality. Forests and trees contribute to the reduction of water-related risks such as landslides, local floods and droughts and help prevent desertification and salinisation. Forested watersheds supply a high proportion of the world's accessible fresh water for domestic, agricultural, industrial and ecological needs in both upstream and downstream areas. A key challenge faced by land, forest and water managers is to maximize the wide range of forest benefits without detriment to water resources and ecosystem function. This is particularly relevant in the context of adaptation to climate change, which increasingly reinforces the importance of sustainable forest management. This report synthesizes the main outcomes and recommendations resulting from several events on forests and water.

[Forest Landscape in Europe: Pattern, Fragmentation and Connectivity](#) / Estreguil et al., Joint Research Centre, 18 p., 2013.

Forest fragmentation is the process of breaking up forest area into individual patches leading to an increase in forest edge length and to isolation of forest fragments. In Europe, this is mainly caused by human activities such as clearing for roads, agriculture and urban settlements or forest fires. This report describes forest landscape patterns and forest fragmentation in Europe, highlighting that 70% of the European territory has poorly connected woodlands. By affecting ecological processes, this situation has a negative impact on the forests' ability to provide ecosystem services such as habitat provision, pollination, disturbance regulation and climate regulation. As such, the mitigation of ecosystem fragmentation is one of the key targets of the European Biodiversity Strategy of 2020.

[Disturbances of EU Forests Caused by Biotic Agents](#) / BIO Intelligence Service, 273 p., 2012.

This study aims to assess the importance of environmental and economic damage to EU forests caused by biotic agents under current conditions and to evaluate the risks under future climatic conditions and scenarios of forest management. It focuses on harmful insects, fungi and nematode diseases as well as wildlife in European forests.

[Forest Fires in Europe, Middle East and North Africa 2011](#) / Joint Research Centre, 109 p., 2012.

This annual report documents the previous year's forest fires, the fire risk evolution, the fire danger forecast and damage assessments, and fire statistics based on data provided by the national experts. A chapter on national reporting gives an overview of the efforts undertaken at national and regional levels.

[Forest fire damage in Natura 2000 sites 2000-2012](#) / San-Miguel-Ayanz et al., JRC, 18 p., 2012.

Over 65 000 fires take place every year in the EU, burning, on average, half a million hectares. Economic losses due to forest fires in the EU territory are estimated to over EUR 2 billion every year. Every year, approximately 80 000 ha are burned within the Natura 2000 sites. Between 2000 and 2012, 1 044 917 ha of Natura 2000 protected areas were burnt, corresponding to 3.3% of the total Natura 2000 area in the affected countries. The environmental and economic damage of these fires is difficult to estimate, since often fires affect protected and endangered species living in these protected habitats. Special emphasis is put on the analysis of damages caused by large fires in the EU Mediterranean region, where most of these fires occur.

[Protecting Forests, Biodiversity, and the Climate: Predicting Policy Impact to Improve Policy Choice](#) / Pfaff et al., Oxford Review of Economic Policy, Volume 28, Number 1, pp. 164–179, 2012. Accessible through the European Parliament's intranet (EP Library). Click on IP authentication for full text access.

The authors argue that policies must balance forest conservation's local costs with its benefits—local to global—in terms of biodiversity, the mitigation of climate change, and other eco-services such as water quality. The trade-offs with development vary across forest locations. The authors argue that considering location in three ways helps to predict policy impact and improve policy choice: (i) policy impacts vary by location because baseline deforestation varies with characteristics (market distances, slopes, soils, etc.) of locations in a landscape; (ii) different mixes of political-economic pressures drive the location of different policies; and (iii) policies can trigger "second-order" or "spillover" effects likely to differ by location. The article provides empirical evidence that suggests the importance of all three considerations, by reviewing evaluations of the impact of conservation and development on forest.

[The Condition of Forests in Europe](#) / ICP Forests, 24 p., 2012.

ICP Forests monitors the status and development of European forest health and vitality and assesses the effects of various stress factors on forest ecosystems. Around a fifth of all trees assessed in 2011 were rated as damaged. Coniferous forests are the most frequently occurring forests in Europe; they show lower levels of defoliation than deciduous forests. European and sessile oak had the highest proportion of damaged trees. Time series show continuously low defoliation in Northern Europe. Worsening trends and peaks in defoliation in Central and Southern Europe are mostly related to drought. Moreover, air pollution affects the stability and nutrition of forests. Forest growth is affected by climate change.

[Destructive Storms in European Forests: Past and Forthcoming Impacts](#) / Gardiner et al., European Forest Institute, 138 p., 2010. See also the [List of 129 Storms](#) and [Information on 11 Selected Storms for Detailed Analysis](#).

This study has compiled existing information on destructive storms affecting European forests in the last 60 years and tries to give some insight on how storms will impact our forests in the future. Damages have been analysed to have an overview of the magnitude of these abiotic disturbances and a 129 storm classification has been developed and is now available. 11 storms have been selected from this classification and have been in depth studied to provide a better understanding of these major biotic agents.

[Biodiversity Conservation in Certified Forests](#) / Sheil et al. (eds), European Tropical Forest Research Network, Tropenbos International, 224 p., 2010.

Approximately 8% of global forest area has been certified under a variety of schemes. The recent estimate suggests that approximately one quarter of global industrial roundwood now comes from certified forests. Most of these advances have occurred outside the tropics: less than 2% of forest area in African, Asian and tropical American forests are certified. Most certified forests (82%) are large and managed by the private sector. This report provides a forum for some of those involved in certification, from academia and from the practice, to air their views on the role of certification in the conservation of tropical biodiversity.

[European Forests – Ecosystem Conditions and Sustainable Use](#) / European Environment Agency, 110 p., 2010.

Europe is struggling to halt the loss of biodiversity. Forests, as the hosts of much of the biological diversity in Europe, are vital to this debate. Any initiative designed to halt the biodiversity loss in

Europe must take forests into account. Among the issues developed in the report are the threats to animals and trees, the impacts of climate change on biological diversity and the need for larger areas of forests to be connected for viable populations, forest management and challenges ahead.

[Forest Soil and Biodiversity in the EU](#) / European Commission, 28 p., 2010.

This brochure presents the results of the conference presenting the "BioSoil study – soil and biodiversity monitoring in the EU". The main conclusions taken from the conference is that it is feasible to have forests soil and biodiversity monitoring at EU level.

[Assessing Biodiversity in Europe – the 2010 Report](#) / European Environment Agency, 68 p., 2010.

This report considers the status and trends of pan-European biodiversity, and the implications of these trends for biodiversity management policy and practice. Forest ecosystems in Europe have endured dramatic historical declines, although in the last 20 years deforestation has largely been reversed. Decline is now limited to only a few regions and in some areas significant forest expansion has occurred. Fragmentation and forest fires are major threats, although smaller woodlands and wood pastures are important for biodiversity in a mosaic landscape. Institutional changes, including privatisation in many former centrally planned economies, have led to intensified commercial forestry in unprotected areas, increasing pressures on biodiversity.

[The Impacts of Invasive Alien Species \(IAS\) in Europe](#) / European Environment Agency, 68p., 2010.

IAS are one of the most important direct drivers of biodiversity loss and ecosystem service changes, and constitute the greatest threat to fragile ecosystems such as islands. Although the introduction of alien species is known to bring benefits to specific sectors of society, they may have far reaching and harmful effects on biodiversity and natural resources for generations. IAS can also cause economic damage to forestry (examples of species: Grey squirrel *Sciurus carolinensis*, Pontic rhododendron *Rhododendron ponticum*).

[European Forest Types – Categories and Types for Sustainable Forest Management Reporting and Policy](#) / European Environment Agency, 114 p., 2006.

This report presents the findings of a study carried out by an international consortium of experts aimed at providing the Ministerial Conference on the Protection of Forests in Europe (MCPFE, "Forest Europe") with an user-friendly forest types classification. The primary goal of the scheme is to improve the MCPFE reporting on sustainable forest management in Europe, with special regard to forest type based indicators.

[Forests and Biodiversity Conservation, Including Protected Areas and Unique Types of Forests Ecosystems](#) / Wildburger, 61 p., 2009.

This document analyzes the provisions of the Non-Legally Binding Instrument on All Types of Forests (NLBI), adopted by the United Nations Forum on Forests in 2007 as well as new emerging issues concerning forest and biodiversity conservation. It presents key figures on status and trends of forest biodiversity and key factors impacting on forest biodiversity. It also discusses forest biodiversity conservation in sustainable forest management. The issue of protected forest areas and their management is investigated, as well as cross-sectoral cooperation in forest biodiversity conservation.

NB: Databases on forest: [European Forest Data Centre \(EFDAC\)](#)

The goal of EFDAC is to become a focal point for policy relevant forest data and information by hosting and pointing to relevant forest information as well as providing web-based tools for accessing information located in EFDAC. The following applications are the core elements of the EFDAC:

[Metadata Catalogue](#): The technical platform consists of a lightweight system that allows users through the web to search, browse and access the forest resources from the metadata catalogue.

[EFDAC Forest Map Viewer Application](#): The EFDAC Forest Map Viewer application is a customized web map service that allows the user to visualize, navigate and query available maps and derived geo-datasets on several forest-related topics

[European Forest Fire Information System \(EFFIS\)](#): EFFIS supports the services in charge of the protection of forests against fires in the EU countries and provides the European Commission services and the European Parliament with updated and reliable information on wildland fires in Europe.

Research on Forests

Examples of forest-related research projects funded by the EU:

[REPHRAME: Development of Improved Methods for Detection, Control and Eradication of Pine Wood Nematode in Support of EU Plant Health Policy](#)

Europe's pine forests are under threat from the introduction of the pine wood nematode (PWN), *Bursaphelenchus xylophilus*. The REPHRAME project brings together Europe's leading experts on PWN, together with colleagues from around the world, to address the key gaps in current knowledge.

[I-REDD+: Impacts of Reducing Emissions from Deforestation and Forest Degradation and Enhancing Carbon Stocks](#)

At COP15 in Copenhagen one outcome was a commitment to develop a mechanism for reducing greenhouse gas emissions from deforestation and forest degradation and enhancing carbon stocks (REDD+). The objective of the project is to obtain an improved understanding of how the implementation of REDD+ mechanisms may reduce emissions of greenhouse gas; impact livelihoods and welfare of local farming communities; impact biodiversity conservation, and provide a realistic framework for monitoring, reporting and verification of REDD.

[BACCARA - Biodiversity and Climate Change, a Risk Analysis](#)

This project evaluates the effect of climate change on forest biodiversity through better understanding of the ecological processes that shape species composition and are particularly sensitive to climate conditions.

[ISEFOR - Increasing Sustainability of European Forests](#)

ISEFOR addresses the problems that will arise from climate change impacts on forest ecosystem vitality, increasing threats from alien invasive pests and pathogens and changing threats from indigenous pests and pathogens, or alien species already established in Europe.

[Trees4Future](#)

Trees4Future is an Integrative European Research Infrastructure project that aims to integrate, develop and improve major forest genetics and forestry research infrastructures. It will provide the wider European forestry research community with easy and comprehensive access to currently scattered sources of information (including genetic databanks, forest modelling tools and wood technology labs) and expertise.

[Strategic Research and Innovation Agenda for 2020 / Forest-Based Sector Technology Platform, 28 p., 2013. Annexes.](#)

Nineteen research and innovation areas (RIAs) have been identified as key to unlocking the potential of the forest-based sector and ensuring its future future competitiveness. The RIAs are organised under four Strategic Themes: the forest-based sector in a biobased society, responsible management of forest resources, creating industrial leadership, and fulfilling consumer needs.

Forests and Food Security

[Forests for Improved Nutrition and Food Security / FAO, 12 p., 2013.](#)

Forests as well as trees on farms are a direct source of food and cash income for more than a billion of the world's poorest people, providing both staple foods and supplemental foods such as fruits, edible leaves and nuts. Trees are an integral part of the agricultural systems of many small-scale farmers, providing both cash and subsistence benefits. These benefits come from trees that are planted or managed on farms as well as from forest resources in communally managed, open-access or State-managed areas. This publication highlights how forests, woodlands and trees support food and nutritional security, both directly and indirectly and

provides policy recommendations on how the contribution of forests and trees to food security can be sustained and enhanced.

[Promoting Decent Employment in Forestry for Improved Nutrition and Food Security / FAO, 19 p., 2013.](#)

Forests contribute to food and nutrition security in many ways. Forests provide direct support to 90% of the world's 1.2 billion poorest people and to nearly half of the 2.8 billion people who live on US\$2 or less per day. Therefore, improving income and job opportunities through decent employment and entrepreneurship development in forestry can make a significant contribution to the well-being and food security of some of the world's poorest people. The first section provides an overview of employment in forestry and describes the main decent work challenges that characterize the sector. The second section discusses the linkages between employment in forestry and the four dimensions of food security: availability, access, utilization and stability. The final section provides policy recommendations.

Recreational and Cultural Dimension of Forests

[Public Preferences Across Europe for Different Forest Stand Types as Sites for Recreation / Edwards et al., Ecology and Society 17\(1\): 27, 11 p., 2012.](#)

A Delphi survey involving experts in forest preference research was carried out to derive scores for the recreational value of 240 forest stand types across Europe. The findings quantify the extent to which forest visitors prefer a degree of management to unmanaged forest nature reserves across the four regions. Phase of development was shown to make the highest contribution to the recreational value of forests while the contribution of tree species type was shown to be relatively unimportant. While the results are indicative, they provide evidence to support long-term retention and low-impact silviculture in forests where recreation is a primary objective of management.

[Forestry and Our Cultural Heritage - Proceedings of the Seminar held in Sunne, Sweden / Ministerial Conference on the Protection of Forests in Europe, 144 p., 2005.](#)

This seminar elaborated on the Vienna Resolution ("Preserving and Enhancing the Social and Cultural Dimensions of Sustainable Forest Management in Europe"), adopted at the fourth Ministerial Conference on the Protection of Forests in Europe in Vienna (2003). The idea is to further promote and raise awareness of the social and cultural dimensions of sustainable forest management.



Author	Guillaume RAGONNAUD, with the support of Filipa AZEVEDO, Policy Department B.
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RESEARCH ON is organised around a concise, scene-setting introduction and statistical snapshot, followed by an annotated list of relevant sources, classified in thematic sections.

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