

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

Forest and Economic Development

A Driver for the Green Economy in the ECE Region



UNITED NATIONS

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Geneva Timber and Forest Study Paper 31

FOREST AND ECONOMIC DEVELOPMENT:

A Driver for the Green Economy
in the ECE Region



UNITED NATIONS
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Note

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Abstract

The study reviews the many ways in which forests contribute to economic development in the ECE region, and analyses, on the basis of recent ECE/FAO studies, 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. It concludes that the way forward is to establish forests and the goods and services they provide as an integrated part of the green economy. This is a major opportunity for the ECE region forest sector, which must not be missed. The Action Plan for the ECE region forest sector in a green economy maps out how the sector could rise to the challenges.

Key Words

Carbon sequestration, employment, forest Products, forests, green economy, innovation, non-wood forest products, payment for ecosystem services, recreation, sustainability, wood energy

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FOREWORD

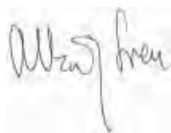
Despite the efforts that have been put into communication by the forest sector, the public is generally not aware of how essential forests are in terms of services and products for their daily life. Likewise, not much is generally known about the contribution of forests to economic development, especially in rural areas. Even forest specialists may underestimate this contribution when they just look at one part of the picture. The value of services is often hidden by wood production, which remains in most cases the main economic driver. But societies place more and more demands on forests and the value of numerous forests lies now more in the services they provide than in the wood they produce.

It is now widely recognized that a forest that has value for conservation, production, protection or recreation, and has clear user rights attached to it, is a forest that will be protected, a forest that will be taken care of. A better recognition of the full value of forests is therefore crucial. From the economic point of view, this can result in better profitability of forest management, which in turn becomes an incentive for public and private investments in the forest sector.

This publication brings together a wide range of information. Its messages are clear and backed by several recent studies, mobilizing all the knowledge and expertise of ECE/FAO and especially those contained in the State of Europe's Forests, the Forest Sector Outlook Studies and the Forest Products Annual Market Reviews.

As shown in this publication, the forests' contribution to the economic development in the ECE region, even if its weight in the GDP is relatively modest, remains significant with potential for development especially in the context of a Green Economy. Forests do a lot for you and can even do more for a healthier world, in a sustainable way. This is certainly one of the key messages of this paper.

The ECE region forests provide multiple benefits and opportunities: this publication presents and analyses them in an interesting and accessible way.



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1. BACKGROUND

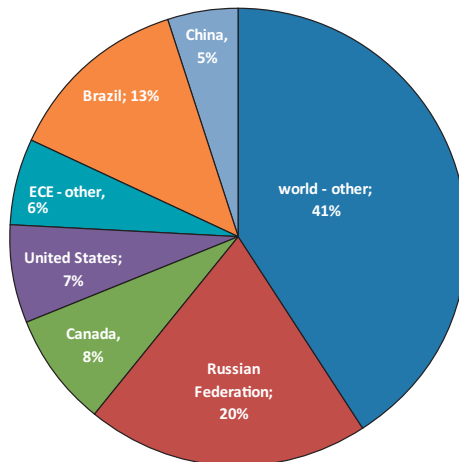
The ECE region has 40% of the world's forests and forests account for 36% of the region's land area (Figures 1 and 2).

Figure 1: The ECE region



Source: ECE, 2012.

Figure 2 : The World's forests, by area



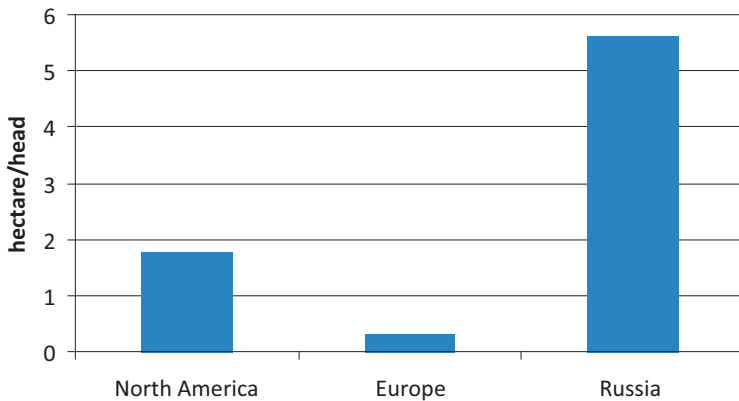
Source: FAO, 2010.

There is a remarkable variety of forest types in the region, from remote boreal forests to dry, Mediterranean-type forests, from peri-urban forests whose main function is

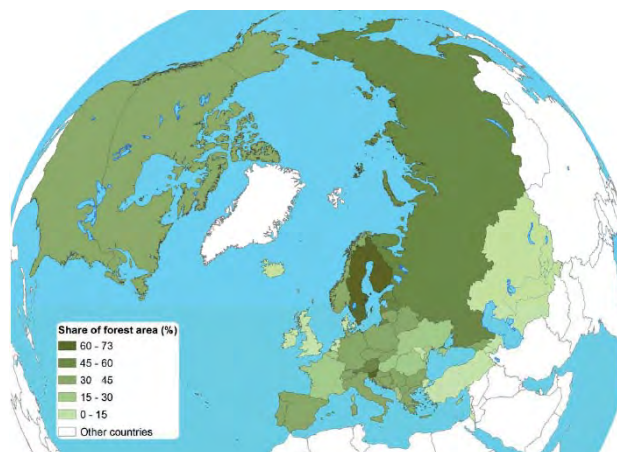
recreation, to mountain forests which protect soil and water against erosion, from forests strictly protected for the conservation of biodiversity to those which aim to maximise wood production, from forests untouched by human influence to those intensely managed in a crowded environment. Many display excellent health and vitality, but others are damaged by fire, insects or pollution. This publication focuses on the region's forests' contribution to economic development, but it must not be forgotten that all Governments in the region aspire to sustainable forest management in all its dimensions.

The ratio between forests and people influences the role forests play in society and the economy. A society with abundant forests and relatively few people will manage its forests differently from a society centred on cities where an important human population exerts constant pressure on the forest resource. The ECE region contains many remote regions with extensive forests but relatively few people, for instance in Russia, Northern Europe and North America, but also many densely populated regions such as Western Europe or the eastern seaboard of the USA. On average each European has 0.3 ha of forest, each North American 1.8 ha, while each Russian has nearly 6 ha. This average compares to a global average of 0.6 ha of forest per person (Figures 3 and 4).

Figure 3 : Forest area per head



Source: FAO, 2010.

Figure 4 : Forest cover in ECE countries, calculated on the basis of FRA 2010

Source: FAO, 2010.

The forest sector does not develop in isolation, but is continually influenced by, and interacts with other sectors/policy fields, such as energy, climate change, biodiversity, agriculture and rural development. The importance of inter-sectoral influences is a constant theme of this publication, although its main focus is on economic development.

This publication brings together information and analysis on forest and economic development in the ECE region, mostly based on outputs of the joint work programme on forests and timber of the United Nations Economic Commission for Europe (ECE) and the Food and Agriculture Organization of the United Nations (FAO), notably their analysis and statistics of forest products markets, forest resource assessment, and sector outlook studies. It brings together policy relevant analysis from these outputs, but does not contain policy recommendations.



2. HOW DO FORESTS CONTRIBUTE TO ECONOMIC DEVELOPMENT IN THE ECE REGION?

Introduction

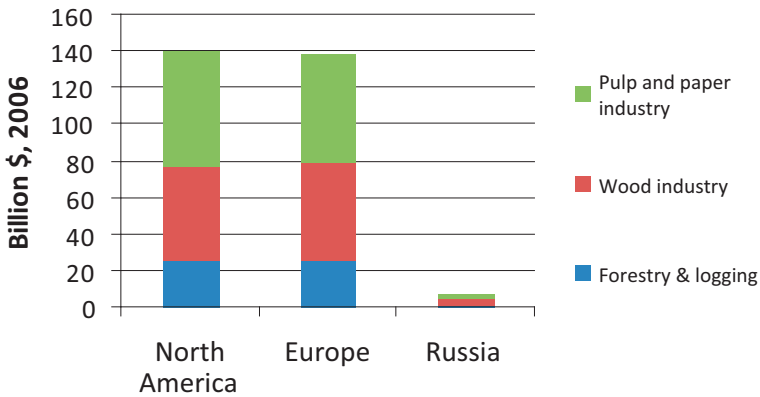
Forests, with the industries which depend on them, create wealth and income, and provide employment and livelihoods. Wood is an important part of the modern economy: it is especially attractive as a raw material and fuel because its supply is often sustainable and it can be used and re-used in a highly efficient low-waste fashion. Through trade, the ECE region supplies other regions' needs for wood and forest products. However, many of the goods and services provided by the forests of the region are not marketed, or indeed assigned monetary value, leading to distorted perceptions of the relative importance of different functions, as well as to economic problems for forest owners.

This section provides a very concise, quantified overview of how forests contribute to economic development in the ECE region.

Forests create wealth and income

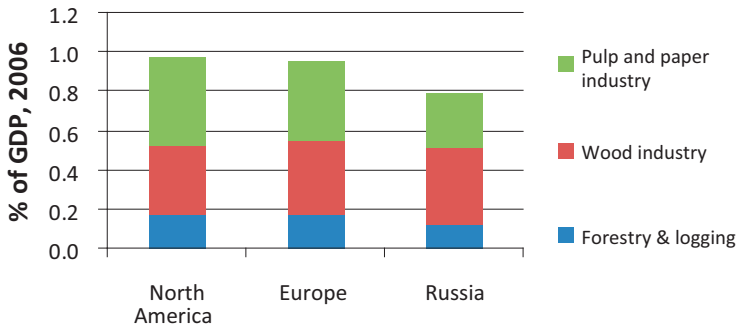
Nearly \$300 billion of economic activity in the ECE region depends on the forest for its main raw material. The economic activities of the "forest sector", defined as forest management, the wood industry (sawnwood and panels) and the pulp and paper industry, account for about 1% of GDP in Europe and North America, and 0.8% for Russia. The value added by the ECE region forest sector is about \$285 billion, of which the great majority - \$233 billion - is by the wood and paper industries. In a few countries, the share of the forest sector GDP is much higher than the regional average, including Finland (5.7%), Sweden (3.8%), Estonia (3.7%), Latvia (3.4%), Canada (2.7%), Bosnia and Herzegovina (2.5%), Lithuania (2.4%), Austria, Belarus and Czech Republic (2.1%) (Figures 5 and 6).

Figure 5: Total value added by the forest sector



Source: Forest Europe/ECE/FAO, 2011 and FAO, 2010.

Figure 6: Forest sector as % of GDP

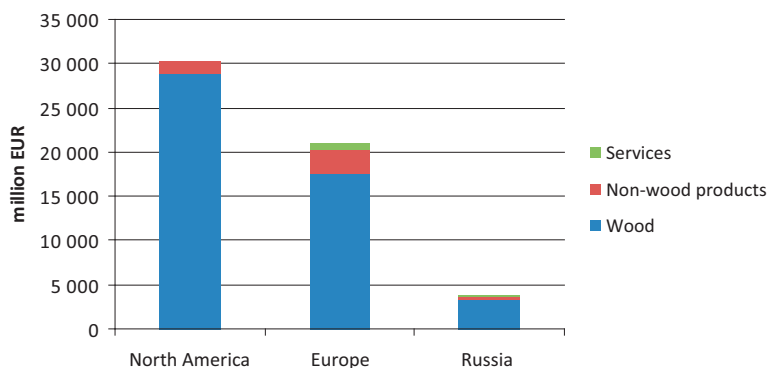


Source: FAO, 2008.

The recorded figures for value added by the forest sector do not include value added in forest related activities, such as tourism, biodiversity conservation, education or administration and government, secondary products such as furniture or joinery, nor many non-wood forest products. Furthermore, many of the goods and services supplied by forests are not assigned a monetary value and do not enter the systems of national accounts. Therefore, all the figures above may be considered under-estimates.

The value of marketed goods and services from forests is overwhelmingly dominated by income from wood sales, even if those can be locally exceeded by other source of income (Figure 7).

Figure 7: Value of marketed goods and services



Note: there is no comparable information on services for North America

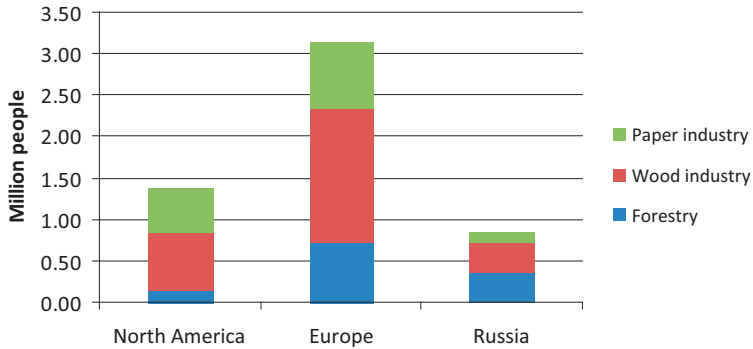
Source: Forest Europe/ECE/FAO, 2011 and FAO, 2010.

The forest sector provides employment and livelihoods

Nearly 5.4 million people work in the forest sector in the region, about 1% of the economically active population. Of these, nearly 60% are in Europe, although European forests are only 13% of the regional total. There are nearly five times more jobs linked to each hectare of forest in Europe than the regional average: this may be due to the quite intensive nature of forest management in Europe and the small scale of many European industrial units. It certainly increases per unit costs in Europe, stimulating a strategic approach focused on high value added. About a quarter of forest sector jobs in the ECE region are in forestry and logging, but this percentage is nearly 45% in Russia and only 10% in North America (Figures 8 and 9).

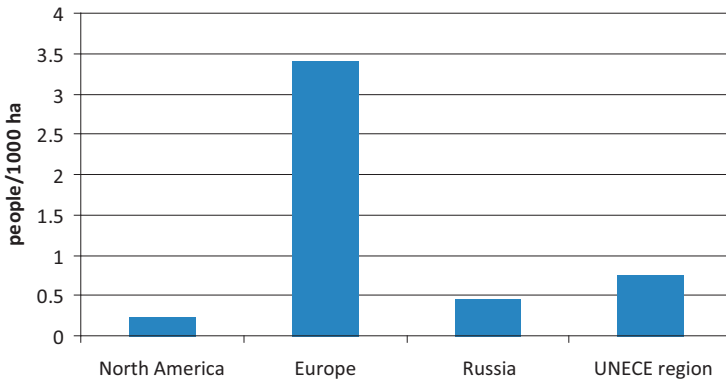


Figure 8: Employment in the forest sector, 2006



Source: FAO, 2008.

Figure 9: Forestry workforce per 1000 ha forest



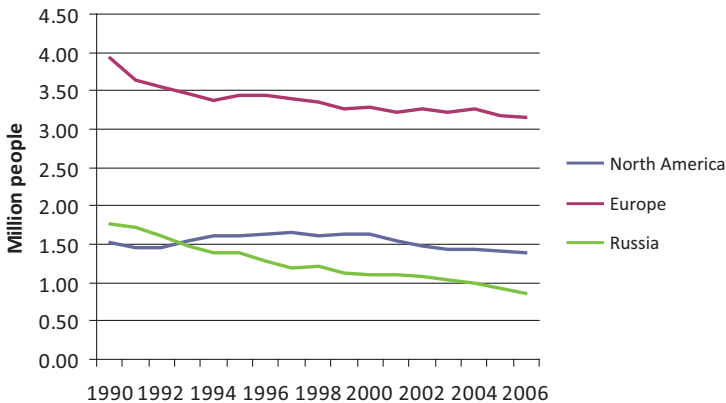
Source: FAO, 2008.

These figures only include people working in enterprises classified as being in forestry and logging, wood or pulp and paper industries. They do not include the increasing number of people who work in other sectors, such as tourism, conservation of biodiversity, education, recreation or government, whose activities are dependent, in one way or another, on forests. Examples of forest related jobs not included in “forest sector employment” would be wardens in forest nature reserves, researchers into the functioning of forest ecosystems, employees of forest certification organisations, civil servants responsible for applying forest law or workers in restaurants in forest areas. It is not possible even to estimate the numbers of these jobs, but they may be significant

and they may be increasing. It is not clear whether these jobs are better paid, with higher status, than those of the traditional workforce or not.

The number recorded as employed in the forest sector has been declining steadily as a result of mechanisation and automation, both in the forest and the factory. Between 1990 and 2006 (most recent available comprehensive data), the workforce fell by a quarter or 1.8 million jobs, continuing a trend apparent since the 1960s (Figure 10).

Figure 10: Employment in the forest sector, 1990-2008.

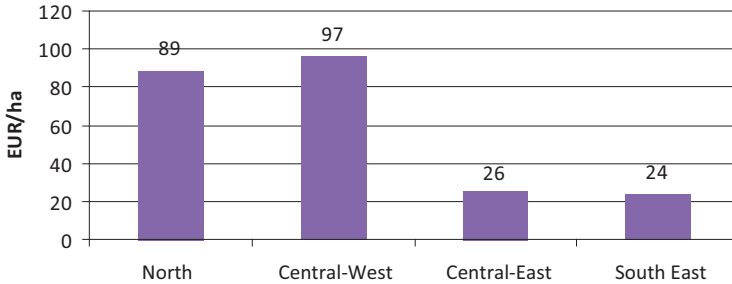


Source: FAO, 2008.

Unfortunately little is known at the international level about forest livelihoods in the ECE region. Half of Europe’s forests are privately owned, often in very small holdings. In the USA, 36% are owned by families and 18% by corporations, with the rest mostly publicly owned. In Canada (92%) and Russia (100%), most forests are publicly owned, although usually operated through a leasing system.

Forests provide revenue for their owners, public or private. According to partial data collected for State of Europe’s Forests (SoEF) 2011 on net entrepreneurial revenue (income, including subsidies, minus costs, including labour costs) for the economic sector “Forestry and logging”, there is considerable variation between regions. Net revenue ranges from nearly €100/ha to about €25/ha or lower. In fact, three European countries (all highly prosperous and urbanised) recorded negative net entrepreneurial revenue over the whole period. It cannot be considered economically sustainable that on average forest owners lose money over a period of twenty years. The average for reporting countries, mostly EU members, was €73/ha. If one applies this average to the whole European forest, the net revenue of forestry and logging in Europe would be about €15 billion a year (Figure 11).

Figure 11: Net entrepreneurial income of forestry, Europe, per hectare, around 2010

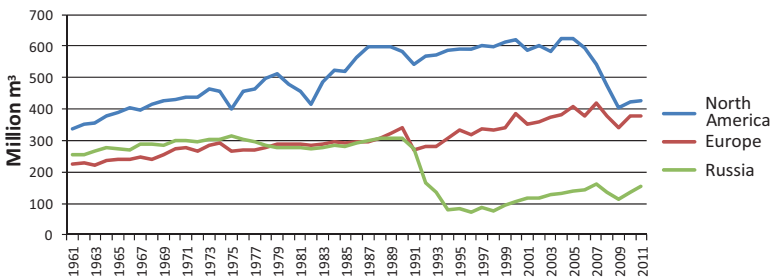


Source: Forest Europe/ECE/FAO, 2011.

Wood is an important renewable raw material and fuel

Over the last 50 years, the volume of industrial roundwood supplied by the forests of the region has grown steadily: the very steep fall registered from 2008, attributable to the general economic crisis and particularly the collapse of the housing market in many countries, is being reversed. The peak of 2007 for the region as a whole was more than 35% above the level of the early 1960s, despite the collapse of Russian harvests in the first half of the 1990s (Figure 12).

Figure 12: Production of industrial roundwood, 1961-2011

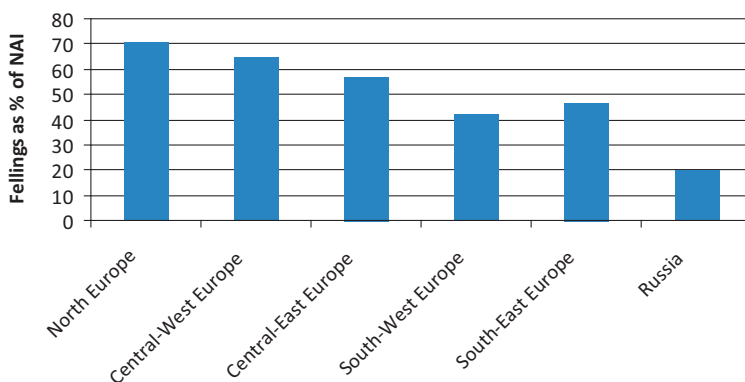


Source: FAOSTAT, 2012.

The volume of wood removed from the region’s forests has been below the net annual growth increment in nearly all countries of the region for several decades (except for a few cases of massive windblow, where of necessity harvests exceed increment for one year). In Europe, fellings are 62% of net annual increment, with significant regional variations, and in Russia only 20%. In the USA, in 2006, according to the US 2010 Sustainable Forest Report, 58% of the net increase in growing stock on timber

lands was removed. Furthermore, this share has certainly dropped in recent years with the fall in harvests caused by the economic downturn. For a number of reasons, the net annual increment is not an accurate measure of potential sustainable wood supply, but it provides a general indication of the situation (Figure 13).

Figure 13: Felling rate, 2010

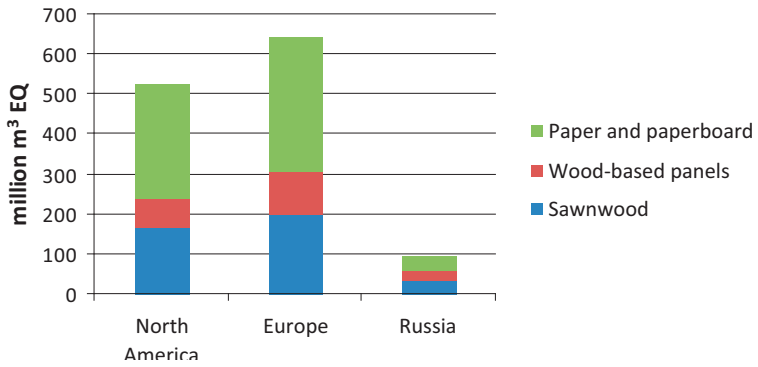


Source: Forest Europe/ECE/FAO, 2011.

In 2007, the ECE region consumed 1.5 billion m³ EQ (wood equivalent) of forest products excluding direct use of wood energy. In 2011, because of the economic crisis, this had fallen to 1.3 billion m³ EQ, about 1 m³ EQ per head. In terms of wood equivalent, just over half the total is for paper and paperboard, followed by sawnwood, then wood based panels. Consumption of both paper and panels has been growing steadily over the last half century, while sawnwood consumption has been stable (it recorded a decline in the 1990s because of the post transition recession in Russia¹) (Figures 14 to 20).

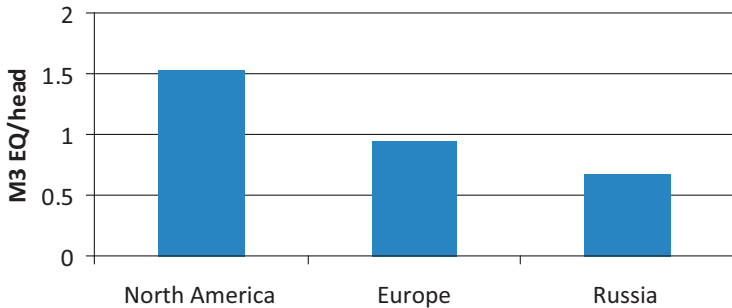
¹ Many experts believe Russian sawnwood consumption is significantly under-estimated as production by small and medium size mills is not properly recorded. See Forest Products Annual Market Review (FPAMR) 2011 section 5.3.

Figure 14: Consumption of forest products, 2011



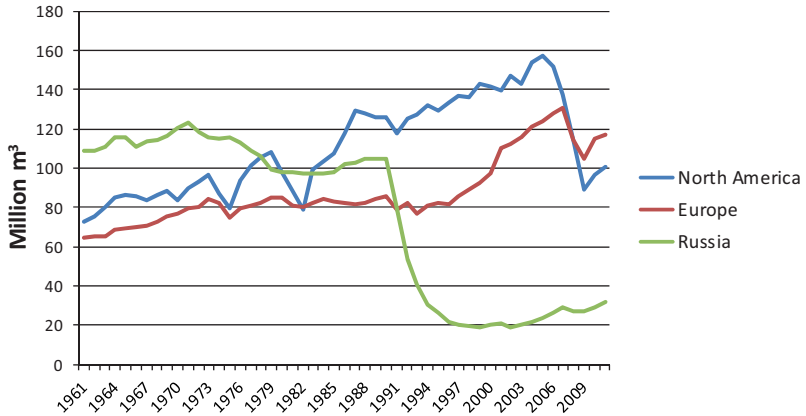
Source: FAOSTAT, 2012.

Figure 15: Consumption of forest products per head, 2011



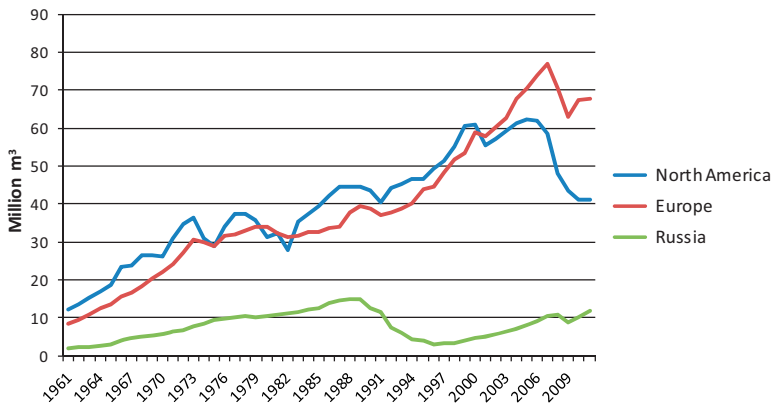
Source: ECE/FAO, 2012.

Figure 16: Production of sawnwood, 1961-2011



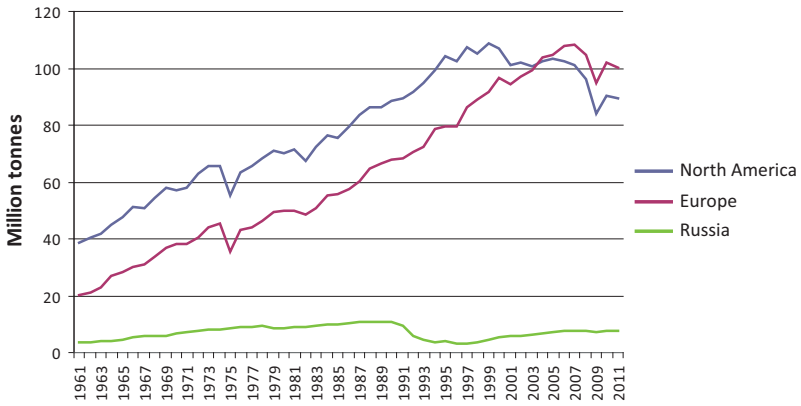
Source: FAOSTAT, 2012.

Figure 17: Production of wood-based panels, 1961-2011



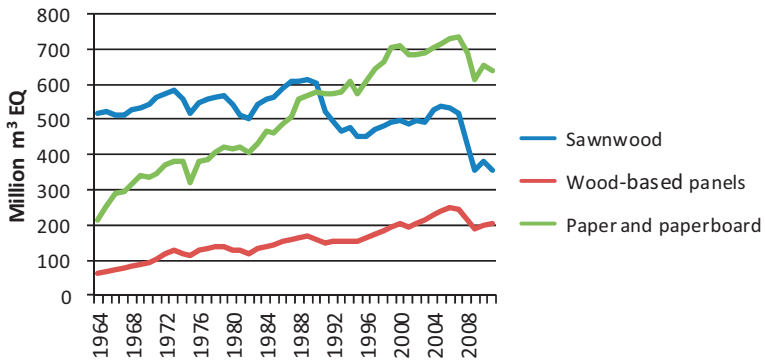
Source: FAOSTAT, 2012.

Figure 18: Production of paper and paperboard, 1961-2011

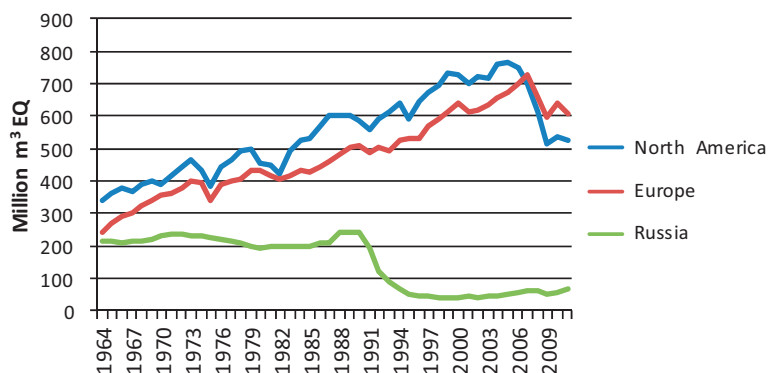


Source: FAOSTAT, 2012.

Figure 19: Consumption of forest products, UNECE region, 1964-2011



Source: FAOSTAT, 2012.

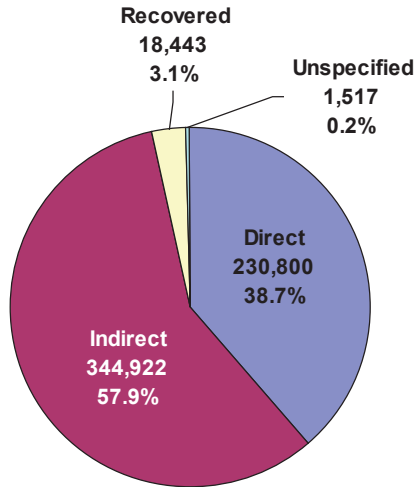
Figure 20: Consumption of forest products, by region, 1964-2011

Source: FAOSTAT, 2012.

Nearly half the wood consumed in the ECE region is used as a source of energy, although these flows are not yet well understood, because of the importance of residue use, auto-consumption and the use of recovered wood. According to the Joint Wood Energy Enquiry which covers most, but by no means all, ECE countries, nearly 600 million m³ of wood were used for energy in responding countries², which is about 0.75 m³ of wood (of which 0.25 m³ directly from forests) used as energy by each inhabitant. Just over a third of this came directly from the forest, with most of the rest being residues of the wood processing industries. Nearly 40% of the wood used for energy was used by the forest industries themselves and about the same percentage was used for residential energy supply. Twenty per cent was used to generate electricity and district heat. In the countries responding to the enquiry, woody biomass accounted for 47% of renewable energy supply, and 3% of total primary energy supply. In Finland and Sweden, the share of wood in total primary energy supply is much higher, 19%. Wood is, by far, the largest source of renewable energy (Figure 21 and 22).

² United States, Russia and 19 European countries. Insufficient or no data were supplied by, among large forest countries, Belarus, Bosnia and Herzegovina, Canada, Poland, Romania, Spain, Turkey and Ukraine.

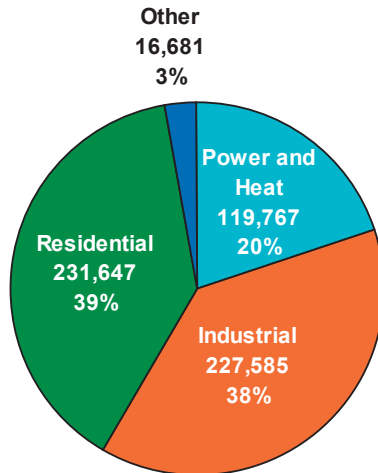
Figure 21: Wood energy sources



Note: The definitions for wood energy sources can be found on page 9 of the JWEE user manual at: http://www.unece.org/fileadmin/DAM/timber/wood_energy/JWEE2011manual.pdf

Source: ECE/FAO, 2012a.

Figure 22: Wood energy uses (1000 m³), 2009



Note: The definitions for wood energy uses can be found on page 9-10 of the 2011 JWEE user manual at: http://www.unece.org/fileadmin/DAM/timber/wood_energy/JWEE2011manual.pdf

Source: ECE/FAO, 2012a.

The levels of consumption of forest products and wood energy towards the end of the decade were probably the highest ever, certainly the highest since the Second World War: do they exceed the limits of sustainable wood supply? As shown earlier, in nearly all countries in the ECE region, harvests are well below the level of net annual increment, and the net trade balance of all parts of the region is positive. As a result, forest growing stock is constantly increasing in the ECE region.

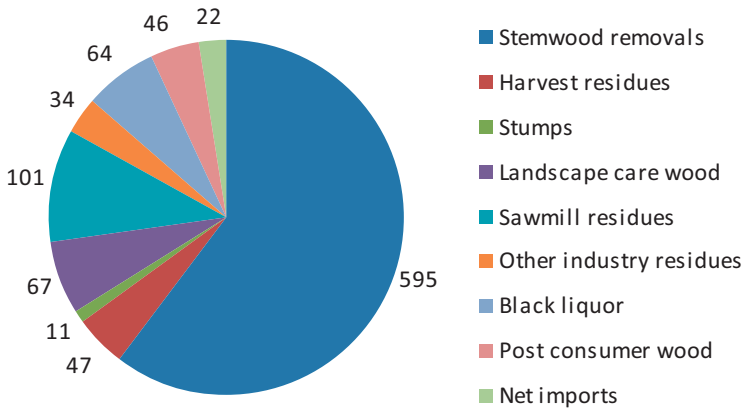
The forest sector is low waste, with high recycling and recovery of products

Wood has many advantages as a raw material, notably that it creates very little waste. For instance, the chips and offcuts generated in sawmills are the raw material for many reconstituted panels and for pulp, the hemi-cellulose and lignin separated from cellulose to make chemical pulp provide process energy, bark and sawdust have many specialised uses and so on. Nearly all wood waste, whether it arises in the forest or the factory, can be used to supply energy. In the ECE region wood for fuel or raw material also comes from branches, even, in a few countries, stumps (“harvest residues”), as well as from hedgerows, orchards, roadsides and urban parks (so-called “landscape care wood”). Paper recovered after use is often used as raw material. Increasingly, recovered wood products are also used as a raw material or a source of energy. This requires complex systems to recover and use these secondary raw materials and energy. There has been steady progress over the decades in minimising all waste, stimulated by the rising costs of waste disposal (e.g. landfill) and rising prices for fossil energy, making wood based energy even more economically attractive.

Stemwood from the forest, still accounts for 60% of wood supply for products and energy³ in Europe, followed by industry residues (10%) and landscape care wood (7%). Post consumer recovered wood, including used pallets, demolition wood, used furniture etc., accounted for nearly 5% of supply, as urban advanced economies address issues of solid waste disposal (Figure 23).

³ As calculated for EFSOS using the Wood Resource Balance approach.

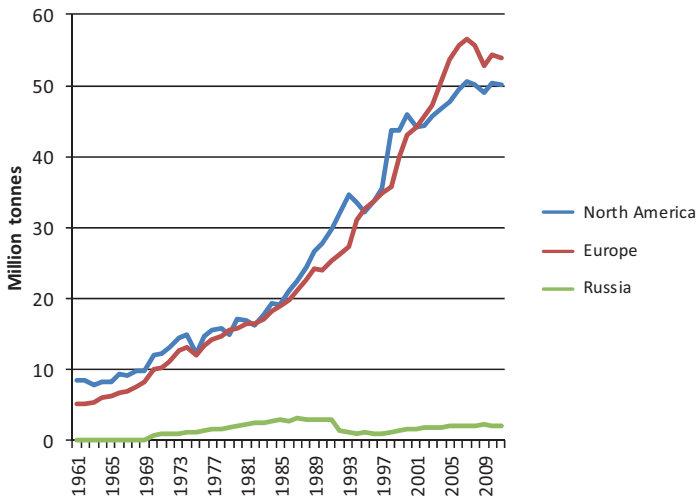
Figure 23: Europe: components of supply, 2010 (million m³ EQ)



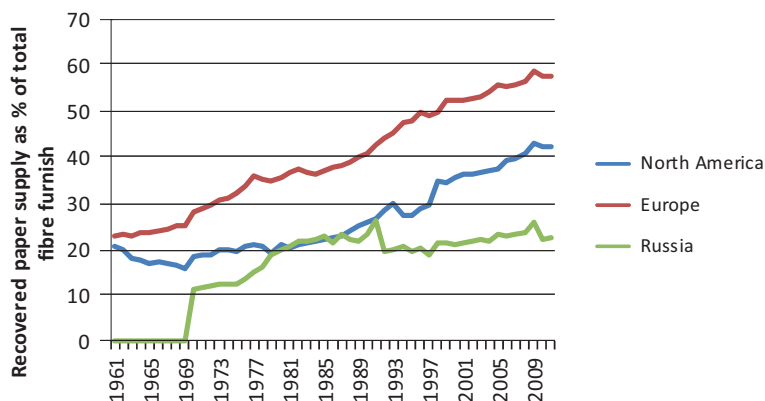
Source: ECE/FAO, 2012a.

The volume of paper recovered for re-use has been growing steadily in Europe and North America for over 50 years, and now accounts for just under 60% of the total fibre supply in Europe, and just over 40% in North America (Figure 24 and 25).

Figure 24: Collection of recovered paper, 1961-2011



Source: FAOSTAT, 2012.

Figure 25: Recovered paper utilisation rate

Source: FAOSTAT, 2012.

This demonstrates that in the ECE region wood is processed and used efficiently, with very little waste, and with the recovery of residues and used products at all stages. Furthermore, as they come from renewable sources and often substitute for non-renewable materials and fuels, the ECE region's forest sector keeps its carbon emissions to a minimum.

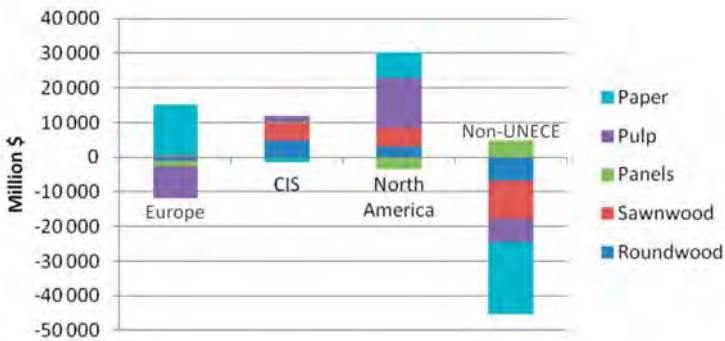
The ECE region supplies other regions with forest products from renewable sources

Forest product markets are complex, global and in constant change as the relative competitiveness of different products and regions develops. Traditional high cost producers are challenged by competitors in areas with favourable growing conditions, low labour costs, expanding markets or other advantages, and respond with cost control, sophisticated technology and logistics and improved marketing. ECE/FAO monitors and analyses these trends.

ECE countries exports of forest products total around \$250 billion in 2007. Most of this trade is within the region, and especially between European countries. Pulp and paper are the most traded products by value. Some parts of the region, for instance Canada, Russia, and the Nordic and Baltic countries, have always been export oriented, satisfying the needs of Western Europe, the USA and other regions. However, structural changes have been taking place since the mid-1990s, as other countries strengthened their exports, chiefly of high value paper products. Germany, in particular, more than doubled the value of its forest products exports between 1990 and 2006, while imports grew much more slowly. As a result, Germany changed from a heavy net importer to a significant net exporter. As a region, Europe is now also a net exporter of forest products.

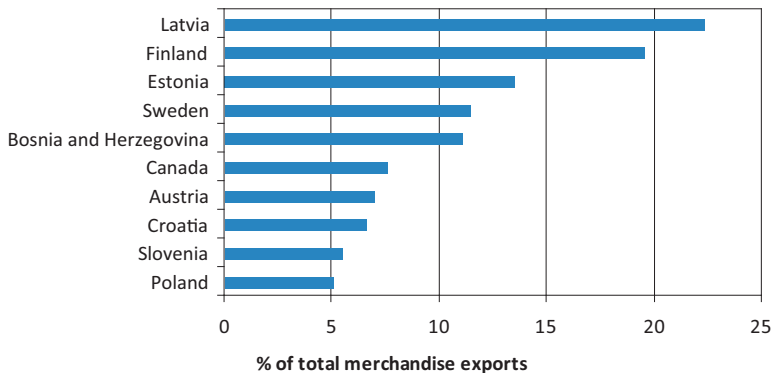
The import dependent countries rely mostly on countries within the region: the ECE sub-regions (North America, Western and Eastern Europe) are now all net exporters of total forest products, in m³ EQ and in value. Europe is still a net importer of roundwood and sawnwood, for instance from North and South America, and Russia, but this is counterbalanced by net exports of paper to destinations all over the world (Figure 26 and 27).

Figure 26: Net trade in forest products, value 2009-2010



Source: FAOSTAT, 2012.

Figure 27: UNECE countries with significant forest products exports



Source: FAOSTAT, 2012.

In North America, net exports had fallen sharply, as a result of Canada’s steady withdrawal from overseas markets in Asia and Europe, to concentrate on the huge

neighbouring US market, in particular supplying wood products for US residential construction. Canada's share of US markets rose sharply in the period between 1990 and 2006, which was the backdrop to considerable tension about softwood lumber trade between the two countries.

Forest products exports account for about 4% of total merchandise exports. This share has fallen sharply in North America, from about 7% since the early nineties. There are 10 countries in the region where forest products account for more than 5% of total merchandise exports. These are Canada, four Nordic/Baltic countries and five central/eastern European countries.

In 2007, Europe exported non-wood forest products of a value of \$1.4 billion, and North America of \$0.4 billion, less than 1% of the total for forest products.

Trade patterns are complex, and vary by product and over time, but a few remarks may be made (all data here refer to value, not volume, and are based on the years 2009 and 2010, the most recent year for which reliable and comprehensive global data are available):

- The ECE region dominates world trade in forest products. Non-ECE countries, account for only 25% of world exports and 36% of world imports, despite the rapid growth in China's imports and exports.
- 40% of world trade in forest products is between European countries.
- Two thirds of the world's imports of industrial roundwood go to Asia, with 40% going to China alone, with significant volumes going to India, Japan and the Republic of Korea. Roundwood suppliers are led by Russia (17%), followed by the USA (11%), New Zealand (8%), Malaysia (6%) and Myanmar (5%)
- Canada is by far the world's largest exporter of sawn softwood (23% of the world total), followed by Sweden (15%), Russia (12%), Finland (8%), Austria (8%) and Germany (7%). The largest single flow is from Canada to the US which accounted for 14% of world trade in sawn softwood in 2009-2010.
- For sawn hardwood, however, non-ECE countries dominate, accounting for 47% of exports and 52% of imports. The leading non-ECE exporter is Malaysia (14%) and the world's largest importer of sawn hardwood is China (20%). However the USA is the world's largest exporter, by value, of sawn hardwood (17%).
- Europe accounts for 48% of world exports of wood based panels and 52% of world imports: Germany alone accounts for 11% of world exports and 7% of world imports. However the largest exporter is China, with 13% of world exports.
- Two thirds of world exports of pulp are accounted for by five countries: Canada (20%), Brazil (18%), USA (15%), Sweden (8%) and Chile (7%). China accounts for a quarter of world imports, from many sources, while Germany and USA take just over 10% each.
- Half of the world's forest products trade, by value, is in paper and paperboard, and this is dominated by European exporters, who take 63% of the total, led by

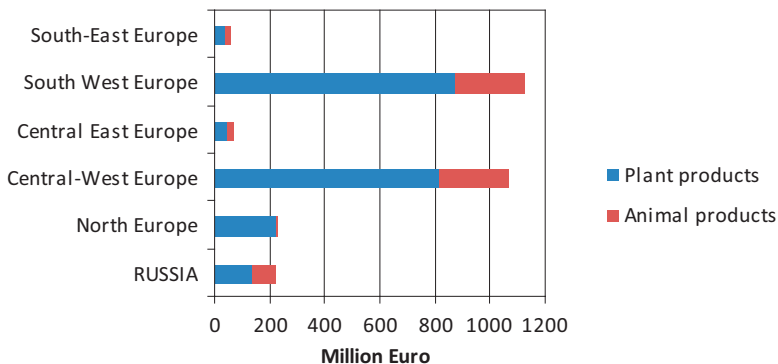
Germany (12%), Finland (11%) and Sweden (10%). The US and Canada account for 9% and 8% respectively. Germany is also the world's biggest importer of paper and paperboard (10%).

This summary overview demonstrates the global nature of trade in forest products, with new sources emerging quite rapidly as well as new markets, influenced by macroeconomic trends, changing cost structures and marketing success or failure.

Forest derived goods and services contribute much more to society and sustainable development than their reported value

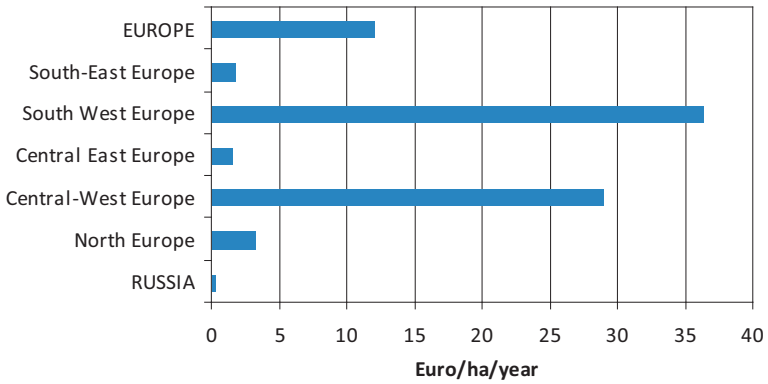
Forests all over the ECE region supply a wide range of non-wood goods and services, which are given high priority in forest sector policy and public opinion. However, their real importance is not reflected in the revenue they generate; indeed most of the services and many non-wood goods are supplied free of charge, with all costs of providing the services absorbed by the forest owner (i.e. subsidised by wood sales). This may lead to a distortion of management priorities where there are tradeoffs between wood supply and the supply of non-wood goods and of services. In Europe, on the basis of incomplete data, the value per hectare of marketed roundwood was estimated at €84/ha, while non-wood products accounted for €12/ha on average, and marketed services for €3/ha. The true value of all the goods and services supplied is certainly much higher than the marketed values (Figure 28, 29 and 30).

Figure 28: Value of marketed non-wood goods



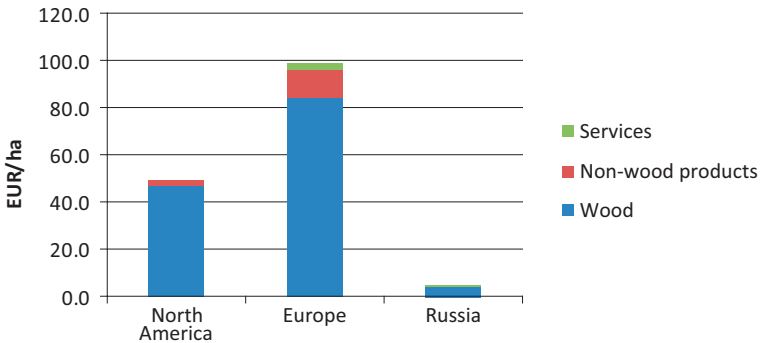
Source: Forest Europe/ECE/FAO, 2011.

Figure 29: Value per hectare of marketed non-wood goods



Source: Forest Europe/ECE/FAO, 2011.

Figure 30: Value per hectare of marketed goods and services



Source: Forest Europe/ECE/FAO, 2011.

Many of the marketed non-wood goods like cork, truffles or special foliage are available only in limited regions. Others, like many berries or mushrooms, may be free to all in certain countries and a marketed product in others. Where there is effective demand and the forest owner can control access to the supply, non-wood goods can generate significant revenue, often more than wood at the local level, and are managed sustainably by responsible forest owners. In the ECE region, this is the case, for instance for cork, Christmas trees, truffles, game meat and pelts. Ownership of the non-wood product may also be a complex problem: honey for instance is often linked to forests,

and considered a non-wood forest product, but the bees find pollen both inside and outside forests, and the honey belongs to the bee-keeper, not the forest owner.

Services pose even more complex problems of valuation, marketing and revenue: it is often impossible to identify an individual supplier or consumer, even though both are necessary if a service is to be marketed. Frequently the service is provided by the existence of the forest and is linked to no specific costs; as no consumer can be excluded, for instance from landscape beauty or erosion protection, there are many “free riders”, often making state intervention necessary if the forest owner is to receive any revenue in exchange for providing the service in question. One example is a situation where there is revenue from tourism in a forest dominated landscape: do the tourism enterprises, such as hotels or restaurants, contribute to management of the forests which help make their service attractive? For all these reasons, the supply of forest services is usually regulated rather than marketed. The forest owner receives no specific compensation for his costs or for any opportunity cost in terms of foregone revenue from wood, and the services are not included in conventional measures of GDP. However, subsidies or other measures which increase the revenue of forest owners are frequently justified by a reference to the non-marketed services they provide.

A major service provided by the region's forests is carbon sequestration. Every year, according to SoEF 2011, Europe's forests sequester 154 Mt C (incl. Russian forests 58 Mt C), the equivalent of nearly 10% of greenhouse gas emissions by these economies. At the rather low carbon prices in May 2012 (€6/ton on the ETS), the value of the carbon sequestered annually by European and Russian forests is €1.1 billion and €348 million respectively. However, this major contribution to the global carbon balance, acknowledged and included in the greenhouse gas accounting systems, does not, in the ECE region, with a few exceptions, generate any significant financial flows or compensations to forest owners. The Clean Development Mechanism (CDM) is not applicable to most ECE countries, payments for carbon sequestration are limited by the Marrakesh Accords, and REDD+ will not apply to most ECE countries. There are few voluntary schemes for carbon in ECE region forests. On the emitting side, the European pulp and paper industry will enter the EU Emission Trading System in 2013.

The forests which are most visible to the population are urban forests. Trees in urban areas provide many benefits and values to society, including recreation, improved air and water quality and aesthetic benefits. In the USA, according to the Resource Planning Act Assessment, urban trees also store about 700 million tons of carbon.

Much work is needed before all these services can be monitored, in volume or in value terms, so that they can be treated equally with wood in policy making, for the forest sector or the economy as a whole. There is progress, but much remains to be done. Before Rio + 20, some leading financial institutions issued the Natural Capital Declaration, which states “The private sector, governments, all of us, must increasingly understand and account for our use of natural capital and recognise the true cost of

economic growth and sustaining human wellbeing today and into the future”.

The public budget contributes significant funds to promote sustainable forest management

Almost all ECE member Governments have stable and effective forest sector laws and institutions, along with national forest programmes or equivalent, based on dialogue with stakeholders and the setting of long term objectives for forest management⁴. As part of the arrangements underlying these regimes, clearly based on social consensus, there are in most countries significant flows of public funds into the forest sector, intended to stimulate progress towards the agreed objectives as well as to compensate forest owners for the un-marketed services and non-wood goods they supply for the benefit of society.

National arrangements vary widely, but usually include some or all of the following types of public expenditure for the forest sector:

- Cost of administering forest law, preventing unauthorised felling etc. and of forest education and training.
- Transfer payments and subsidies to forest owners in the context of forest sector programmes, or others, such as regional development, rural development, agriculture or environment. These can be at the national level, the subnational level (when forestry is the responsibility of provinces or regions), or in the context of the EU. There are also a very few cases of payment for forest ecosystem services, where a “consumer”, often a public body, directly compensates a forest owner for a specified ecosystem service.
- Net profit/loss from managing publicly owned forests: management costs, minus revenue from those forests. Increasingly state forest organisations are run as independent entities, and can be contributors to the national budget. Some are financed from the state budget, with forest derived income being paid directly into the public purse. Also some activities, such as the management of “non-economic” forests may receive special subsidies or public forests are expected to absorb certain costs linked to non-marketed goods and services, creating an opportunity cost for the public forest manager.
- Favourable fiscal treatment of forest owners, for instance to take into account the special characteristics of forest management (e.g. long periods without income with the major income of a rotation concentrated into a few years). In some countries forests are under a special fiscal regime or forest owners are exempted from certain taxes, such as inheritance tax.

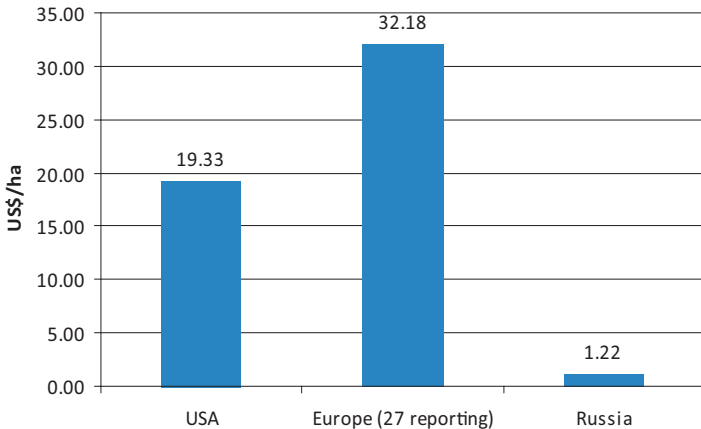
The costs outlined above are central to the concerns of forest sector policy makers at the national level, but have not been much analysed at the international level, and there are few, if any, comprehensive and comparable data sets⁵. It is clear, however that significant sums are involved. According to FRA 2010, annual public expenditure per

⁴ See SoEF 2011, Part II, and relevant Montréal Process documents for full information.

⁵ FRA 2010 requested information on public expenditure for forests and SoEF 2011 on government payment for forest services, but the information supplied is partial, not comparable and difficult to understand.

hectare of forest was \$32/ha in Europe, \$19/ha in the USA and only \$1/ha for the huge area of Russian forest. There are very wide differences between European countries, with seven countries below \$10/ha and six above \$100/ha⁶: the causes of the differences may be partly statistical, but it is notable that all of the countries with low public expenditure have a strong production oriented forest sector, while most of those with high public expenditure give a lower priority to wood production. For Europe, the figure of \$32/ha for public expenditure, reported by FRA 2010, may be compared to the average annual net revenue from forestry and logging (not including subsidies etc.) of €73/ha, reported by SoEF 2011, even though the two figures are not strictly comparable. This ratio of roughly 1:2 between public expenditure and wood sales, may appear high, and has not been analysed in depth, but indicates the importance of public funds in financing forestry in the ECE region, although national circumstances and priorities vary widely (Figure 31).

Figure 31: Public expenditure per hectare of forest, 2005



Source: FAO, 2010.

Some forests have become vehicles for investment by financial institutions

Like any other economic activity, the forest sector requires investment to maintain and expand its productive capital. To attract capital for investment, an enterprise must be able to generate a rate of return on capital which is competitive to alternative uses of the same capital. The capital raised must be used wisely, whether supplied from private or public sources. With respect to investment, the conditions are quite different for forest industries and for forestry, so the two parts of the forest sector are treated separately below.

Investment in the forest industries follows basically the same rules as other

⁶ Below \$10/ha: Belarus, Lithuania, Poland, Romania, Serbia, Slovakia, Sweden. Over \$100/ha: Denmark, Iceland, Ireland, Italy, Netherlands, UK. Data missing for several major countries.

industrial sectors: enterprises (at least the larger firms) raise capital through loans, bonds or share issues, on global capital markets. The availability of investment capital depends mainly on the present and expected financial health of the company. There is evidence that the return on investment in the forest industries, some of which are very capital intensive (pulp mills), has been relatively low, making raising capital for investment in the sector more difficult or expensive. In some cases, there has been payment from public sources to encourage investment in the forest industries, for instance for job creation in rural areas, but this is not the primary source of investment capital for the forest industries.

However, **investment in forests** differs from normal investment in several important ways. It has a number of specific features which often make it unattractive for large financial institutions. In particular:

- Investment periods are very long, because of long rotation periods, which increases exposure to risk, and make profitability forecasts very uncertain;
- Many of the goods and services produced in multi-functional forests have no monetary value and generate no revenue, but incur costs (or at least opportunity costs);
- Many forest owners have management objectives other than maximising profit. Many forests are publicly owned, or the holdings are so small as to make profit maximising management impossible;
- The markets in forest land are in many cases not liquid or transparent, with few opportunities to buy, many special circumstances for each sale and very weak price information;
- Forest management is highly regulated, which may increase costs and reduces the choices of the investor.

Most investment in forestry is by the forest owners themselves, private and public. However there are in most cases no national statistics on how much capital is invested, or what is the rate of return. It is likely that most owners, including public owners, cover their costs with income from wood sales and other sources, and keep any long term surplus, without raising external capital, or calculating the opportunity cost of the capital employed. In other words, they do not calculate whether the capital tied up in a forest could earn a better return if invested elsewhere.

Since the 1980s however, there has been a strong increase in timberland investment by large private investors, who have specific financial objectives. This type of investor focuses on intensely managed, privately owned, timberland, aimed primarily at wood production. A recent FAO study⁷, on which this section is based, estimated the area of “investable” timberlands, worldwide, at 165 million ha, less than 5% of the global forest area (but presumably providing a much larger percentage of the world’s wood supply).

⁷ <http://www.fao.org/docrep/015/an901e/an901e00.pdf>.

The total value of this type of investment in forests is estimated at \$300-500 billion. Of this, about \$50 billion is held by institutional investors, most of it indirectly via entities established by investment managers specialized in forest investment, and the rest by wealthy individuals and privately held forest products firms. Although most investments are in North America, there are also significant holdings in Australasia and South America, and increasingly in sub-Saharan Africa, and Southeast Asia.

These investors choose to invest in forests in order to diversify their risks (forests have a completely different investment profile from, say, equity or bonds), and because there is a predictable physical growth (the annual increment of the trees), whatever the market conditions, which provides some protection against inflation. The long term nature of forestry also fits some investors' needs, notably those of pension funds, which have long term obligations (i.e. to pay pensions) which correspond to the long term growth of the timber resource. Moreover, the value of the forest land increases the security of the investment.

There have been other factors underlying the rapid growth in timberland investment since the 1980s, starting in the USA. These included a legal requirement that pension funds diversify their holdings⁸, the desire of forest industry companies to dispose of their forest holdings to focus on their industrial activities, the withdrawal of national forests from timber supply, which improved market conditions for private forest owners in the US, and the creation of specialised investment vehicles⁹, some with advantageous fiscal conditions. From 1983 to 2009, 17.6 million hectares valued at \$ 39.7 billion changed ownership type. Publicly-traded USA forest products companies sold 15.3 million hectares valued at \$33.1 billion, while investment managers and REITs gained 11 million hectares valued at \$30.4 billion. In 15 of the 23 years between 1987 and 2009, the NCREIF Timberland Index¹⁰ in the USA outperformed the Standard & Poors 500 index.

The FAO study considered that despite weak market conditions around 2010, there was potential to increase financial investment in timberland, including in developing countries. However, as the investment is long term and not movable, there is considerable risk, so investors attach great importance to sound policies and investment conditions in the country concerned. According to the FAO study, the most important country factors, in order of importance, were political stability, established private property rights, well-functioning legal and banking systems, strong domestic consumption of forest products, a stable tax system, acceptable currency policy/risk, and proven management capacity. As a "rule of thumb," 10 years of relative stability was mentioned as a pre-condition for investing in a developing country. Investment managers also mentioned the critical importance of active, competitive markets for the primary forest products they grow. The most prominent "no go" condition noted by managers was the prevalence of corrupt business practices. Investors generally seek forest investments that can be certified as

⁸ Employee Retirement Income Security Act of 1974 (ERISA).

⁹ Real Estate Investment Trusts (REITs).

¹⁰ National Council of Real Estate Investment Fiduciaries.

sustainably managed.





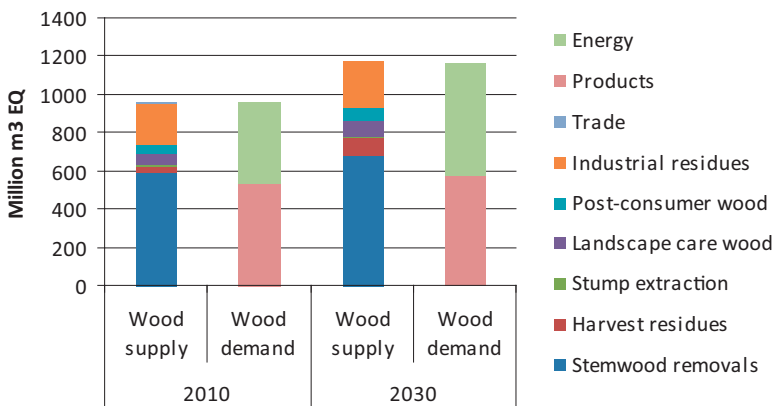
3. OUTLOOK AND MAJOR POLICY CHALLENGES

Outlook for the ECE region forest sector

Two recent ECE/FAO studies and one FAO study have described and analysed the outlook for the forest sector in the region and the possible consequences of certain policy choices. They are all based on scenarios projecting the future situation and trends under different assumptions, and are intended to provide an analytic and quantitative basis for policy making. All three take an inter-sectoral approach, analysing the interactions between the forest sector and other sectors. For information on methods, assumptions, data problems etc., readers are referred to the studies themselves.

The second European Forest Sector Outlook Study (EFSOS II), the latest in a series which started in 1953, in its reference scenario for the twenty years between 2010 and 2030, describes a situation where the economy grows relatively slowly, leading to steadily increasing demand for forest products. Demand for wood energy rises more strongly than for products. In response, the supply of wood in Europe, from forests, but also from harvest and industrial residues, as well as landscape care wood and recovered wood, will expand. Forest area is assumed to continue to grow as in the past, through natural expansion and as a consequence of forest policy in certain countries. Net imports of wood raw material would decline in the reference scenario (Figure 32).

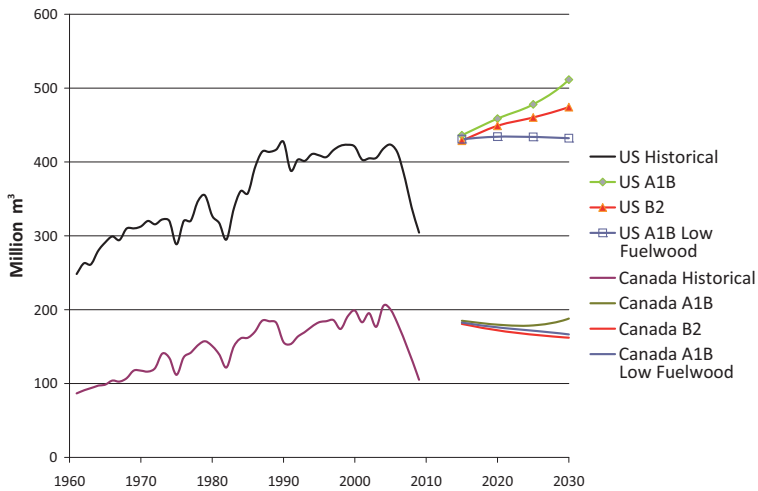
Figure 32: EFSOS II reference scenario



Source: ECE, 2011a.

The two main scenarios (A1B and B2) of the North American Forest Sector Outlook Study (NAFSOS), based, like those of EFSOS, on common assumptions prepared by IPCC¹¹, also describe steady economic growth, increasing production and consumption of forest products and rising volumes of standing timber inventories, without large changes in forest product imports from other regions. Forest area would be stable in Canada, but decline in the US (by about 3% in 20 years), mainly due to urban expansion, but growing stock would rise. Production of wood fuel would rise very fast (Figure 33).

Figure 33: North America: production of industrial roundwood



Source: ECE, 2012b.

The Russian Forest Sector Outlook Study (RUFOS) starts from the fact that the “colossal forest potential of the country is essentially under-utilised” as the existing system is obsolete and in need of fundamental reconstruction, and the opportunities are under-estimated by policy makers. The “inertial scenario”, based on past trends, projects steady growth in forest area and growing stock, as well as harvest and consumption of forest product. But the “innovation scenario”, which assumes a dynamic input from all actors, notably the Russian state, foresees a significant increase of roundwood production between 2010 and 2030, to reach over 300 million m³ (compared to 230 million m³ in the inertial scenario). This increased supply would go mostly to the domestic market, where heavy investment in plant and infrastructure as well as promotion of forest products would increase consumption. Exports would grow more slowly than domestic

¹¹ Intergovernmental Panel on Climate Change.

consumption. The study also stresses the risk to Russian forests from climate change and the necessity to adapt to drastically changed circumstances, notably dryer and hotter conditions, leading to even more severe damage from fires and insects than at present. In particular, the forecast thawing of the extensive areas of permafrost (two thirds of the country's land area), will intensify global climate change and result in irreversible damage to forest hydrological regimes in Russia.

The following sections explore major policy issues, mostly on the basis of the analysis in these studies. No new analysis was undertaken for this paper, only compilation and synthesis of analysis carried out for the outlook studies and elsewhere.

How much can the forests of the ECE region contribute, on a sustainable basis, to the supply of renewable energy?

Governments in the ECE region, as well as the EU and international organisations, are encouraging the development of renewable energy, for reasons of climate change mitigation, and energy security. To reach the ambitious targets set for renewable energy will necessitate a significant increase in the supply of wood energy, as wood is, by a considerable margin, the largest renewable energy now (see section 3.4), alongside an even faster development of other renewables such as wind, solar, other biomass or wave energy, as well as energy efficiency. Two questions face policy makers and experts in the forest sector and the energy sector of the ECE region:

- How much wood can be supplied for energy on a sustainable basis?
- What will be the consequences for other parts of the forest sector of a strong increase in wood energy supply? Areas of particular interest are the consequences for biodiversity, and the effect on the wood supply of the forest industries.

EFSOS II, NAFSOS and RUFOS provide relevant information on both of these issues, which is summarised below.

In Europe, EFSOS II¹² shows that it is physically possible to meet the ambitious targets for renewable energy, if some rather optimistic assumptions are accepted. In particular, to reach the targets with a sustainable supply of wood energy necessitates complete success in meeting energy efficiency targets, and rapid growth in non-wood renewable energy, so that wood's share of renewable energy falls significantly. However, EFSOS II did not assume any increase in wood supplied by energy plantations on agricultural land (which would, in any case, be unable to provide significant volumes in the twenty year time-span of the study) or imports from other regions. EFSOS II estimates that an extra 242 million m³ of wood could be supplied in 2030, compared to the reference scenario, by improving wood mobilisation and management intensity, using all the potential of landscape care wood and recovered wood, and, above all, greatly increasing the use of harvest residues, from both branches and stumps. Wood would then account for 40% of renewable energy, compared to about 50% in 2010, as non-wood renewable

¹² In the Promoting wood energy scenario.

energies, like solar or wind, many of which are in the phase of rapid expansion, grow faster than wood. Although harvest would remain below increment and growing stock would not decline, the study considers that this would lead to negative consequences for biodiversity. The volume of wood available to the forest industries would decrease compared to the reference scenario and wood prices would rise.

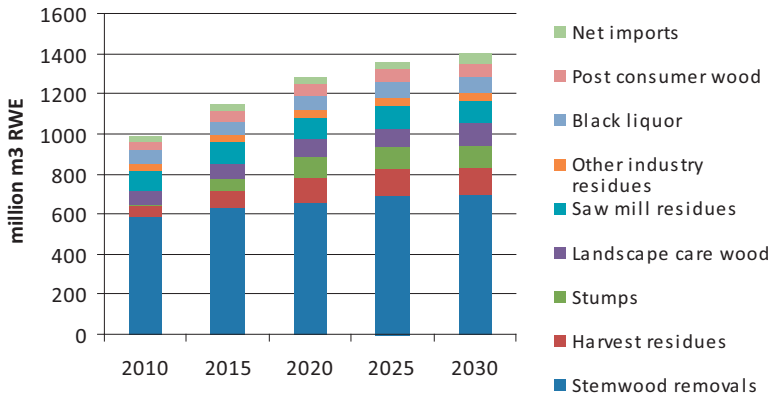
NAFSOS also explores the consequences for the sector of significant increases in the use of wood in the energy sector. (For NAFSOS, these increases were necessary to be consistent with the projected quantities of bioenergy in IPCC scenarios.) The NAFSOS “Low fuelwood” scenario, which assumes no significant growth of a wood-based bioenergy sector in North America or elsewhere, projects a 5% increase in fuelwood produced and consumed globally by 2030 compared to 2006. However, to reach the higher bioenergy levels foreseen in the two NAFSOS IPCC-based scenarios, a 35-75% increase was projected over the same period in global fuelwood supply. In North America, excluding Mexico, in the highest scenario (A1B), an extra 100 million m³ of industrial wood production and extra fuelwood consumption of 166 million m³, compared to the “Low fuelwood” scenario, are projected.¹³ In addition, production of products derived from small wood (panels, pulp, paper) is rather lower, and roundwood prices significantly higher, especially after 2030.

RUFOS expects that wood consumption for biofuels, at present 30 million m³, would increase strongly to about 45 million m³ in the inertial (business-as-usual) scenario, but to over 70 million m³ in the innovation scenario. High energy value products, such as charcoal, pellets and wood based liquid fuels would grow particularly fast.

Thus the official outlook studies for the region conclude that it is possible to increase significantly the supply of wood for energy, and even to reach the ambitious policy targets. However, this would require very significant political and financial investment to mobilise wood supplies, and would have negative consequences for the forest industries, notably those using small low value wood, and probably for biodiversity as well. In recent years however, there has been a steep increase in European imports of wood energy, in the form of chips and pellets, from other regions, notably Canada and Russia. This indicates that part of the increase in wood energy supply in Europe may come from overseas. Criteria for sustainability of these supplies are being put in place by the EU, to prevent its wood energy supply from being based on unsustainable sources (Figures 34 and 35).

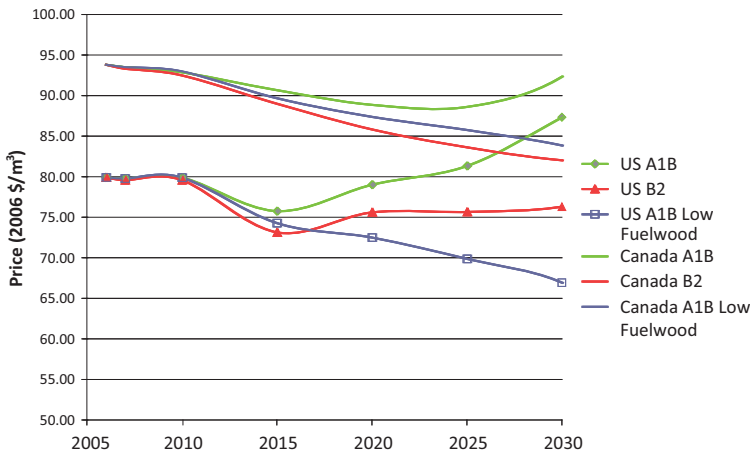
¹³ The FPAMR noted that wood energy in the United States is continuing to decline as a share of renewable energy consumption, falling from 35% in 2000 to 22% in 2012.

Figure 34: EFSOS II Promoting wood energy scenario: components of supply



Source: ECE, 2011a.

Figure 35: Price of Industrial Roundwood, Projections to 2030



Source: ECE, 2012b.

Can future wood demand be satisfied on a sustainable basis?

Assessing the sustainability of forest management is a complex undertaking, as it requires the quantification and combination of very different types of information on all aspects of forest management, and comparing the data to benchmarks. ECE/FAO, is at present, developing a method which could be applied in the next study of the State of

Europe's Forests. Are the futures described by EFSOS II, NAFSOS and RUFOSOS sustainable from all points of view, not only wood supply?

EFSOS II developed an experimental method to assess the sustainability of the reference and policy scenarios, which covered five of the six¹⁴ pan-European criteria of sustainable forest management. Changes due to the projected developments in sixteen parameters were assessed, using a method based on that used in State of Europe's Forests 2011. The authors stress that the method is still experimental and needs further development. The results show that the differences between the scenarios are not so great as to cause concern, although some trade-offs and warning signals are apparent. In particular, the increased harvesting pressure linked to the *Promoting wood energy* scenario has negative consequences for biodiversity while the *Priority to biodiversity* scenario increases biodiversity, as intended, but perhaps at a cost to forest health and vitality and the production function. However it should be mentioned that the negative impact of the *Promoting wood energy* scenario on biodiversity remains questioned as examples are showing that intensively managed forests, which promotes thinnings, result in increased wood availability and richer biodiversity than forests with a low level of management. In all the EFSOS II scenarios, forest area and growing stock continue to increase, and carbon to accumulate in the forest ecosystem. However, policy makers should be aware of the possible trade-offs apparent in EFSOS II between increased wood energy and biodiversity.

NAFSOS does not have a formal, comprehensive sustainability analysis, but some major points may be derived from the data. In particular, wood supply appears to be on a sustainable basis, as, despite a small drop in forest area in the USA, growing stock in North America increases and harvest remains below increment in all the scenarios.

The RPA (Resource Planning Act) assessment for the United States, at present in press, which reports current and projected future states of the forest and rangeland sector up to 2060, provides more information relevant to sustainability in that country, consistent with the wood supply and demand scenarios presented in NAFSOS. Assuming no changes in policy:

- It expects that forest area will shrink in the US by about 3% in 20 years, as a result of urbanization and other land development. The declining forest area, coupled with climate change and harvesting, will alter forest-type composition.
- US forests also face threats to their long-term health and sustainability, as native and exotic pests and pathogens, fire, and other natural disturbances, combined with climate change, pose ongoing risks to forests.
- Growing stock will continue to increase until 2040, but then start to decline: investments in plantations and forest productivity would be offset by higher harvests and reduced area, especially for hardwood.

¹⁴ Criterion 5 – protective functions of the forest has proved very difficult to assess. However, there seems to be no imminent threat to protective functions in Europe.

- Urban forests are likely to become more important in providing crucial services to local residents in the future as urban growth reduces natural landscapes.
- The RPA land use projections indicate that intensive land uses and housing development are expected to increase in forested landscapes. In response to these land use changes, most forest bird communities are expected to support a lower variety of species.
- Recreation resources, for instance public forests, are likely to become less available as more people compete to use them, setting a major challenge for natural resource managers and planners.

RUFOS mostly addresses the unreachd wood production potential of the Russian forest, and recommends much higher harvest levels and more intensive forest management. However, this would not be at the expense of the sustainability of wood supply: even in the highest (“innovation”) scenario, only half of the under-utilized annual increment would be used. Given the size of the country, the scope for increasing harvest is quite large, although the challenge of creating adequate infrastructure, mainly its cost, is great. The main threats to sustainability mentioned by RUFOS are forest damage due to, or exacerbated by, climate change, notably catastrophic fires, insect outbreaks and permafrost thawing.



Developing a sustainable workforce

Sustainable forest management cannot be achieved without an adequate workforce: large enough for the task in hand, with the right skills to be effective and efficient. The growing productivity in all parts of the forest sector has steadily reduced the numbers of workers required, but serious concerns have been expressed about the long term sustainability of the workforce. Demographic change and an aging working force are a threat to the sustainability of the work force. According to SoEF 2011, in Europe, 25% of the forestry work force is over 50 years old, and in North Europe, this proportion reaches 37%. Forestry remains a very dangerous occupation: in Europe every year, about one out of ten forest workers suffers from an accident and 200 people are killed in forest work. The high rates of accident, injury and illness¹⁵, the strenuous nature of many forest jobs, along with the remote working places (which often change daily for forest workers), and the low status attached to many of the jobs make it difficult in Europe to recruit sufficient young workers with appropriate qualifications. In the United States, logging workers had the second highest fatality rate (after fishing workers) of all job categories examined, 93.5 deaths per 100,000 full-time equivalent workers in 2010, and 60 total deaths in 2010.¹⁶ In Canada, there were an average of 34 deaths annually in the logging and forestry sector between 1996 and 2005, representing the industry with the second highest rate (after the category “mining, quarrying, and oil wells”) of workplace fatalities (42.6 per 100,000 full-time equivalent workers) in the country.¹⁷

Most forest harvesting work is no longer done by permanent employees of the forest owners or of the forest industries, but by self-employed contractors, usually small enterprises operating one or two harvesters. While this arrangement is very efficient and flexible, and relieves forest owners and industries of the cost of permanent staff, serious problems arise as to wage rates, job security and occupational safety and health for contractors and their employees. These enterprises are hard to monitor as the small, highly mobile teams work in remote areas. Despite the projected increase in production, both in forestry and the forest industries, it is likely that workforce numbers will continue to decline as automation and mechanisation continue to increase labour productivity in forest and mill. However, there are indications that there are limits to this increase, and that these limits are being approached in some countries, such as the Nordic countries. In these countries mechanisation is very advanced and probably cannot progress much further, so the decline in the work force numbers may be slowed within the next decade.

“Decent green jobs” are an essential part of the emerging green economy. “Green jobs” are defined in a recent ILO/UNEP study as those which contribute substantially to preserving or restoring environmental quality, while “decent jobs” are those that meet

¹⁵ The rates of illness are partly attributable to the mechanisation which has reduced the risk of injury, but increased prevalence of illness due to vibration in chainsaws and harvesters/forwarders.

¹⁶ United States Bureau of Labor Statistics (2012), “2010 Census of Fatal Occupational Injuries (revised data)”. Available at <http://www.bls.gov/iif/oshcfoi1.htm#2010>.

¹⁷ From tables 8 and 9 in: Andrew Sharpe and Jill Hardt (2006), “Five Deaths a Day: Workplace Fatalities in Canada, 1993-2005”, Centre for the Study of Living Standards, Ottawa, Ontario. Available at <http://www.csls.ca/reports/csls2006-04.pdf>.

the longstanding demands and goals of the labour movement, i.e. adequate wages, safe working conditions, and worker rights, including the right to organize labour unions. Working for sustainable forest management should be considered “green” as SFM preserves and restores environmental quality in a major ecosystem. But are most forest sector jobs, especially in the forest itself, “decent” according to the ILO definition? The partial data available indicate that this is not always the case, even in the ECE region: occupational safety and health is a major concern, and salary and other working conditions vary widely. For example, in the U.S. logging sector, workers are among the lowest paid of all worker categories, averaging less than \$12 per hour in 2011, compared to the national median of about \$22 per hour.¹⁸

If the forest sector workforce is to have full access to decent green jobs, skilled young workers must be attracted to the forest sector professions, by improved safety and health conditions, better wages and working conditions, and higher status. These goals can be achieved by investment in education and training, and by long term policies to strengthen the work force. The higher wage costs which will inevitably result must be compensated by improved productivity and by stronger focus on higher value added production. The present situation, at least for forest work in Europe, of dangerous jobs, with poor working conditions and low social status, which might be termed an erosion of the human capital of the sector, is surely not sustainable in the long term.



¹⁸ U.S. Bureau of Labor Statistics, May 2011 National Occupational Employment and Wage Estimates. Available at: http://www.bls.gov/oes/current/oes_nat.htm#00-0000.

Developing and implementing payment for forest ecosystem services

Forests are multi-functional, but many of the non-wood goods and services they supply provide no revenue to the forest owner. This may lead to distortion of management objectives, in favour of revenue generating activities, notably wood production, and to revenue problems for forest owners. Insufficient revenue for forest owners may cause some of them to give up altogether on active forest management, or, where this is permitted, to change land use, for instance to residential development. One policy remedy, frequently applied, is a general subsidy to forest owners or forest management: this improves the forest owner's financial situation, but is often not effective in promoting the supply of goods and services other than wood. In fact, the net result of undifferentiated subsidies, which result in lower forest management costs, can be a subsidy to wood production, whose ultimate beneficiaries are wood-using industries, not the consumers of non-wood goods and forest services, or even the forest owners themselves. A major policy challenge is to provide framework conditions for an economically viable forest sector without being dependent on direct state subsidies for production.

In recent years, the concept of payment for ecosystem services has been developed as a partial remedy to the problems described above, which affect many ecosystems, not only forests. "Payment for ecosystem services" (PES) is defined by the ECE Water Convention as a contractual transaction between a buyer and a seller for an ecosystem service or a land use/management practice likely to secure that service. A body of theory and case studies has been developed as a guide to setting up PES schemes¹⁹.

There are different approaches to PES:

- using payments to encourage a form of land management that will maintain or enhance the services/benefits that an ecosystem provides; or,
- using payments to stop activities that put those services/benefits at risk, or to prevent a change of land-use that would have negative impacts.

PES can be a means to improve forest and other natural resource management practices, generate income and sustain livelihoods. Investing in PES also helps to ensure that those who benefit from a particular ecosystem service compensate those who provide the service, so that the latter are provided with an incentive to continue to provide that service. However, it is not uncontroversial. Some commentators consider PES, which is fundamentally a market-based approach, to be a more effective policy tool than government intervention, although some others see PES as ethically less satisfactory than strengthening the law in accordance with the "polluter pays" principle. PES can also be seen as a mechanism to enforce the "user-pays principle" calling upon the user of a natural resource to bear the cost of using that resource.

¹⁹ See in particular the background paper for the ECE/FAO workshop in July 2011.

PES schemes have emerged in a multitude of forms related to the contractual arrangements, the methods of charging and payment, and the participation of contracting parties. The type of buyer (States, public/private utilities, business or others) will influence the type of PES and the type of financial arrangements. It should also be borne in mind that PES is not the ideal solution everywhere.

The general trend is for the number of PES schemes to increase. The majority of PES programmes worldwide are located in Latin America, but there are also numerous schemes in Europe and North America, particularly in forest/biodiversity programmes (Table 1). A literature search of PES schemes, focusing on the ECE region, found that 79 PES schemes were in operation, and 13 were under development. Of these 79 schemes, 37 were primarily focused on forest/biodiversity.

Table 1

Examples of PES schemes in the ECE region

The Southern Finland Forest Biodiversity Programme (METSO)	In a pilot phase, voluntary conservation instruments, based on which land-owners could contract their land for a fixed period, establish a private protected area or sell the land to the state. After standardisation measures, compensation was based on lost timber income only.
KOMET Programme, Sweden	This voluntary scheme, focused on biologically important forest, aims to raise the owners' awareness of the conservation value of their land, and to encourage them to enter nature conservation agreements or other forms of site protection.
Payments for drinking water from forested catchments Canton Basel-Stadt, Switzerland	Water from the Rhine is redirected into forested recharge areas. Water consumers pay for the sustainable management of forests belonging to the city of Basel through an additional charge in their water bill
Vittel PES Scheme, France	A privately initiated PES system. The Vittel brand of bottled water entered into long-term (30-year) contracts with the 26 largest farm operations in the watershed.
Henniez SA, Switzerland	A mineral water company extracts its water from a natural spring in woodland without intensive agriculture. The company bought the land in order to protect its mineral water product from pollutants by halting arable production on this land.
The "Drinking water forest" (Trinkwasserwald® e.V.)	An NGO promoted the conversion of coniferous forest into deciduous forests to increase the generation of groundwater. Private contracts are signed between Trinkwasserwald e.V. and the public or private forest land owners for a period of more than 20 years.
Copenhagen Energy PES scheme	Copenhagen Energy seeks to protect a groundwater body through afforestation measures and the designation of well-head protection zones where no pesticides are used.

Moldova Soil Conservation Project	An afforestation/reforestation Clean Development Mechanism (CDM) project which is afforesting and reforesting degraded and eroded state-owned and communal agricultural lands throughout the country.
Afforestation with Hazelnut Plantations in Western Georgia	The project, developed by a private company, sequesters carbon on previously abandoned land in a poor rural region near the Black Sea coast.
Albania Assisted Natural Regeneration Project	Part of a World Bank project, a CDM approved project funded from the sale of carbon credits for afforestation and reforestation.
Conservation Banking in California, USA	Agencies must agree to conserve high quality habitat in order to receive endangered species offset credits, which are tradeable.
WWF Danube River Basin Programme, Bulgaria, Romania, Serbia and Ukraine	Promotes PES as a river basin management policy framework in Europe, linked directly with the EU policies and instruments. Aims to test how PES can be applied at a larger scale.

Source: text boxes in the ECE/FAO background paper

A number of preconditions for the establishment and implementation of PES have been identified in the literature and through practical experiences. The following list, which is non-exhaustive, illustrates some key considerations:

- the institutional and legislative framework (legally binding environmental standards, judicial and compliance review mechanisms, enforcement procedures and appropriate institutional frameworks);
- resource and tenure rights (the forest owner must have legal title to the service he is selling, which is not always the case, for instance when there is unlimited public access by law to the forests);
- motivations, rights and responsibilities of landowners;
- monitoring, enforcement and compliance;
- ensuring continuity and predictability and avoiding “leakage.” (i.e. where adopting PES in one location may lead to increased pressure to convert or degrade ecosystem services elsewhere).

In short, in the ECE region, payment for ecosystem services is a very attractive and potentially transformative concept, which might generate very significant revenue flows, where the basic ideas have been largely clarified, and many pilot schemes are in place. However, PES is by no means yet widespread or common practice, or the perfect solution in every case. To move from theory to practice will require considerable investment of political will in providing the necessary supportive framework, as well as the commitment of major funds. However, the efficiency and focus of the method should make it possible to reach declared objectives at a lower cost than by traditional “broad-brush” subsidy schemes, and the cost might be more fairly distributed between the general taxpayer and the beneficiaries of the services.

Promoting innovative forest products and services

The forest sector is strongly traditional. Wood is the oldest fuel and building material. Sawnwood has been used for millennia. Paper has been based on wood pulp since the Renaissance. The basic principles of silviculture were formulated in the eighteenth century. This continuity and respect for tradition is a strength of the sector, but can weaken the drive to innovation which is necessary in a fast changing global economy and society. The technical progress in the sector has focused on improving and optimising products, processes and organisation, notably through computerization, rather than on developing and marketing radically new products. Does the forest sector innovate enough to remain competitive with younger, more dynamic sectors? This section considers possible avenues to explore, what are the framework conditions which promote innovation, and what might be the consequences of a more innovative forest sector.

There are essentially four types of innovation: product innovation, process innovation, marketing innovation, and organisational innovation. The main innovations which could have an impact on the forest sector, identified by an informal brainstorming meeting and developed for EFSOS II are summarised below:

In the **sawnwood and panels** sector, there is potential to develop new types of combined product with improved technical features and lower raw material and processing costs (Engineered Wood Products). These will be incorporated into integrated and prefabricated systems for both construction and renovation.

In the **pulp and paper** sector, innovation potential is with improved paper machines and processes, as well as with new products such as paper or lignin based batteries, smart packaging (e.g. heat sensitive) and intelligent paper which delivers extra information to the user, e.g. "use by" dates, integrity of contents.

Biorefineries are being developed to produce a wide range of products and fuels from wood, or its components (cellulose, hemicellulose and lignin). Many of the chemical processes have been known since the 1940s, but are now becoming economic because of technical advance and the rising price of oil. A few biorefineries are already in operation, sometimes on the site of former pulp mills, and extensive research programmes are under way.

Innovation is also possible, indeed desirable, in **forest management**, for instance in developing and marketing new recreation services, schemes for payment for ecosystem services, better wood marketing systems and new markets for non-wood goods. Wood production can be enhanced by tree breeding and genetic modifications.

Successful innovation could open new markets (or defend existing ones against innovative competitors), and increase profit margins by developing high value added products instead of commodities which only compete on price. It would not necessarily

lead to higher wood consumption as the innovative products might use wood more efficiently or replace existing products. Innovative forest management could certainly increase the revenue of forest owners.

Many conditions must be satisfied to encourage successful innovation, and these are the subject of much research. Some of the main features of an innovation friendly environment are:

- A good science and knowledge base, with capable research institutes, and good networks. At present expenditure on research and development by the forest sector is rather low.
- Excellent physical infrastructure (transport, communication, internet, housing etc.).
- An educated and skilled workforce.
- Sound intellectual property rules and institutions.
- Entrepreneurship.
- Flexibility of organisation and regulation.
- Access to capital, whether venture capital, loans or internally generated capital.
- Open markets.
- Appropriate product standards (i.e. performance based, not prescriptive).
- Access to marketing and communication.
- Culture which welcomes and rewards innovation.

None of these is sufficient by itself to promote innovation: all must be addressed together. It is the role of national governments to ensure the framework conditions for an “innovation society” are developed. This can be a matter for regulation, information or financial measures.

With a few exceptions, the culture of the forest sector has stressed prudence and sustainability over innovation and risk taking, so the development of a truly innovative culture in the forest sector will require fundamental changes in attitude from many of the actors in the sector. This new innovative spirit must not of course damage the long standing concern for sustainability, which characterises the ECE region forest sector at present.

These principles are not specific to the forest sector, and policy makers in the sector should advocate ‘innovation-friendly’ policies for society as a whole, not just the forest sector. However, there are some specific measures which could promote innovation in the sector, if they are part of a wider set of enabling conditions. These include: vocational training in forest related areas; dedicated research institutes, with adequate resources; sector-specific organisations with flexible and appropriate structures; access to finance for new forest sector firms; rapid diffusion of best practice inside the sector; open

markets for wood and forest products; investment in public forest related research (an example is COST E51 Integrating Innovation and Development Policies for the Forest Sector); excellent knowledge infrastructure for the sector; and innovative state forest organisations.

Demonstrating and communicating sustainable forest management, inside and outside the sector

Over the last two decades, faced with negative public perceptions, arising in particular from tropical deforestation, and under close scrutiny by NGOs, the forest sector has made great progress in measuring, monitoring, assessing and promoting sustainable forest management, and in improving sector governance. It has created innovative and transparent solutions, which in some cases show the way to other sectors. Certainly, trends in all aspects of forest policy and management are much better monitored now than in the early 1990s, and forest products arriving at consumer markets in Europe or North America have received intense scrutiny from a number of independent bodies, as regards the environmental and social conditions of the forestry, harvesting and processing which created them. Few, if any, other raw materials are monitored in such detail. This is a potential competitive advantage to forest products in the marketplace, as they are now in a position to demonstrate the sustainability of their supply chain. Many in the forest sector feel that similar demands (which have significant costs) should be made on competing materials and fuels.



The areas where the forest sector is leading the world in defining, demonstrating and communicating sustainability include:

- Wood from sustainable sources, which plays a significant and long term role in mitigating climate change by substituting for non-renewable materials in the building sector, e.g. green buildings, or by replacing non-renewable energy sources.
- Forest certification, as a number of powerful competing systems give a choice to forest managers. The systems have developed not only rules of sustainable practice, but also systems to develop consensus on forestry practice, to accredit certifying agencies and to support forest owners. In 2011, in Europe, 51% of the forests were certified by at least one system, in North America 33% and in the CIS 5%. 88% of the world's certified forests are in the ECE region, although the share of supply coming from certified forests is not yet known with any accuracy.
- Traceability/chain of custody certification systems which track wood from the forest to the retailer, giving the final consumer the assurance that the product he/she buys comes from a sustainably managed forest. In 2011, according to FPAMR, 28 423 chain of custody certificates had been issued worldwide by the two leading systems, PEFC and FSC.
- Criteria and indicators of sustainable forest management, which provide an agreed regional framework for dialogue and policy formulation, as well as monitoring and assessing sustainable forest management at the national or sub-national level, and communicating the results. In the ECE region, there are two sets of criteria and indicators, developed by FOREST EUROPE and the Montréal Process.
- Market measures against illegal logging and trade in illegally produced wood. The Lacey Act in the US, the EU timber trade regulation and similar legislation elsewhere aim to deny market access to wood which is not legally or sustainably produced. This legislation is rapidly changing the business practices of the forest sector.
- National forest programmes, or equivalent, based on a transparent, inclusive and iterative process, which are now in place for most ECE countries.

However, there have been areas where the forest sector has not succeeded in working closely with other sectors. Forest sector policy evolves in an increasingly complex international framework, with EU instruments affecting forestry, the two regional processes, including the negotiation of a possible Legally Binding Agreement on Forest in Europe, and at the global level, the UN Forum on Forests which has drawn up a Non-Legally Binding Instrument on all Types of Forests, as well as forest related instruments and measures under the Convention on Biological Diversity and the UN Framework Convention on Climate Change, and a wide range of more focused institutions and instruments.





4. THE WAY FORWARD: ESTABLISHING FORESTS AND THE GOODS AND SERVICES THEY PROVIDE AS AN INTEGRATED PART OF THE GREEN ECONOMY

The forest sector and economic development come together in the concept of the green economy and the forest sector's role in it. Because of its specific characteristics as a sector dependent on a multifunctional renewable resource which provides many goods and services which are not marketed in the conventional economy, the forest sector will be profoundly influenced by the emerging green economy and should play a leading role in promoting its establishment. ECE/FAO has been mandated to develop an Action Plan for the ECE region forest sector in the green economy, and develop related concepts, which are valid for the region and the global level. This part of the paper is based on work in progress on this topic, and cites the Action Plan as of November 2012.

The Action Plan for the forest sector in a green economy

The Action Plan describes how the forest sector in the ECE region could lead the way towards the emerging green economy at the global level. It identifies an overall vision and strategies and a number of areas of activity. For each area of activity, it proposes specific actions, and identifies potential actors, who might contribute to achieving the stated objectives. It is not a binding work plan, nor does it contain prescriptive recommendations to Governments, international organisations or stakeholders, who are free to participate, or not to participate, in the Action Plan as they wish.

The Action Plan reflects the ideas of participants in the process but does not constitute a binding commitment by any participant.

The Action Plan:

- a) Defines how the ECE region's forest sector could contribute to the development of a green economy and monitors progress in this respect.
- b) Promotes the sharing and implementation of best practice concerning the green economy.
- c) Promotes the development and implementation of policies for the forest sector which are effective in achieving goals, efficient in the use of resources and equitable in their treatment of all actors, both inside and outside the sector.

- d) Communicates the potential of the ECE region's forest sector to policy makers, the general public and decision makers in other sectors.

The five pillars of the Action Plan are:

- Sustainable production and consumption of forest products;
- A low carbon forest sector;
- Decent green jobs in the forest sector;
- Valuation of, and payment for, forest ecosystem services;
- Monitoring and governance of the forest sector in the green economy.

The Action Plan is the outcome of a two-year inclusive process of consultation, under the leadership of the ECE Timber Committee and the FAO European Forestry Commission. It will be presented for approval to the Committee and the Commission at their joint session in December 2013, in Rovaniemi, Finland, and will be taken into account in the review of the two bodies' joint work programme.

Definition of the forest sector in a green economy

The forest sector in a green economy is defined by the Action Plan as a forest sector which contributes to the emerging green economy by improving human well-being and social equity while significantly reducing environmental risks and ecological scarcities. In every aspect of its activities, it minimises its carbon emissions, uses its resources efficiently and is socially inclusive.

Preparing the forest sector for the green economy is fully compatible with making progress towards **sustainable forest management**. Indeed a forest sector which plays a leading role in a green economy is promoting sustainable development, in the forest sector and outside it.

Vision

The Action Plan is based on the following vision of the forest sector in a green economy:

- *In a green economy, the forest sector makes a maximum contribution to human well-being, through the supply of marketed and unmarketed forest goods and services, and the creation of revenue and livelihoods, while maintaining and developing forest ecosystem services on a sustainable basis within the context of a changing climate.*
- *In a green economy, the forest sector protects the welfare of all stakeholders, including forest dependent indigenous peoples and the forestry workforce, uses all resources wisely and economically, and contributes to the mitigation of climate change through both sequestration and substitution.*

- *In a green economy, forest sector governance systems take into full account all of the ecosystem services provided by the forest, compensating suppliers for providing them whenever feasible. Progress is monitored in a transparent way, and policies adjusted to reach the goals which will be agreed at the national, regional or local levels. The forest sector learns from other parts of the emerging green economy and shares its own experience with them, to mutual benefit.*

The Vision and the Action Plan as a whole take into account the commitments made by ECE region Governments in other processes for instance the European Forest 2020 decision adopted at the last Forest Europe Ministerial Conference in June 2011 or the Non-Legally Binding Instrument adopted by the General Assembly on the recommendation of the 7th session of the United Nations Forum on Forests.

Principles for the ECE region forest sector in the emerging green economy

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

- The forest sector uses all its resources, especially those arising from the forest, wisely and economically, minimising waste, recovering, reusing 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.
- The forest sector takes all externalities fully into account in policy making, introducing payment for forest ecosystem services when feasible.
- The forest sector bases its governance on evidence-based decision making and the transparent monitoring of progress towards sustainable forest management.



5. CONCLUSION

This paper has demonstrated the major role the forest sector plays in the economic development of the ECE region, a role which is underestimated in conventional economic analysis, chiefly through the failure to take account of positive externalities. It has shown that:

- The ECE region forest sector contributes about \$300 billion to the economy of the region, which is approximately 1% of GDP, but this share reaches 3-6% in a few countries.
- Nearly 5.4 million people work in the forest sector as formally defined, about 1% of the economically active population. This does not include the many people whose jobs are classified in other sectors but depend, at least in part, on forests. The number of people working in forestry and the wood processing industries has been shrinking steadily as a result of improved productivity.
- The inhabitants of the ECE region each consume on average forest products for about the equivalent of 1 m³ of wood each year, in addition to about 0.25 m³ of wood for energy extracted directly from forests. Wood harvests are well below the physical potential of forests all over the region, so the natural physical capital is growing steadily.
- There is practically no wastage of wood, as the sector puts almost all harvest and industry residues and recovered paper and wood to good use. Landscape care wood (from urban forests, orchards, roadsides etc.) and recovered wood (e.g. pallets, demolition wood) are becoming significant sources of raw material and fuel.
- All three parts of the ECE region are net exporters in an increasingly complex and competitive global market for forest products. ECE countries exports of forest products are worth about \$250 billion, much of which is exported to destinations within the region.
- ECE region forests provide a wide range of non-wood goods and services, many of which are undervalued, or not valued or marketed. The failure to value some of the forest's main functions, including carbon sequestration, protection and biodiversity functions and the supply of recreation, is at the root of important policy distortions.²⁰
- Expenditure of public funds on forests is difficult to measure, but significant: it is estimated at an average of \$32/ha in Europe (with very wide national dif-

²⁰ The report of the Independent Panel on Forestry in England, published as this paper was completed, is but one of many reports drawing attention to this issue. The Panel writes "We urgently need a valuation of our woodlands that takes full account of all these benefits. Then the case for increased public investment in our woods and forests, and for developing markets for these wider services, will be clear and compelling... In our report we urge society as a whole to value woodlands for the full range of benefits they bring. We call on Government to pioneer a new approach to valuing and rewarding the management, improvement and expansion of the woodland ecosystems for all the benefits they provide to people, nature and the green economy."

ferences), \$19/ha in the USA and \$1/ha in Russia. This includes administrative costs, transfer payments, the net costs/benefits of managing publicly owned forests, and fiscal advantages to compensate for specific features of forest ownership.

- Financial institutions have started to make major investments in intensely managed wood production forests, mostly in North America.

The paper also analyses how the ECE region might respond to the challenges linked to forests and economic development, basing the analysis on recently published ECE/FAO studies of the outlook for Europe, North America and Russia:

- It is possible to increase significantly the supply of wood for energy. However, this would require very significant political and financial investment to mobilise wood supplies, and, under current conditions, could have negative consequences for the producers of panels and pulp, and possibly for biodiversity. Yet, these negative consequences could be offset through the intensification of thinnings that would supply small dimension wood for energy and contribute to increased biodiversity.
- All outlooks considered in the studies are sustainable from the point of view of wood supply, and foresee increased harvests combined with expanding growing stock. However there are tradeoffs between increased mobilisation and other dimensions of sustainability, such as biodiversity. The studies also point to threats to forests from climate change, fire, pests and pathogens and urban expansion.
- Forest work is still dangerous, often with poor working conditions and low social status. If the forest workforce is to have “decent green jobs”, skilled young workers must be attracted to the forestry professions, by improved safety and health conditions, better wages and working conditions, and higher social status.
- Payment for ecosystem services (PES) is a very attractive and potentially transformative concept, which might generate very significant revenue flows and reduce policy distortions, although it is not the preferred solution in every case. To move from theory to practice will require considerable investment of political will in providing the necessary supportive framework, as well as the commitment of major funds. However, the efficiency, and focus of the method should make it possible to reach declared objectives at a lower cost than by traditional “broad-brush” subsidy schemes, and the cost might be more fairly distributed between the general taxpayer and the beneficiaries of the services. Transparency and public understanding would also benefit from PES.
- There is considerable potential for increased innovation, in the forest industries and markets, but also in forest management, and this innovation would improve the sector’s competitiveness. However, the development of a truly innovative culture in the forest sector will require fundamental changes in attitude

from many of the actors in the sector and policy support within the sector and in society as a whole. The new innovative spirit must not of course damage the long standing concern for sustainability which characterises the ECE region forest sector at present.

- The governance of the forest sector has made enormous progress towards transparency and evidence-based decision making since the first Rio Conference in 1992, through instruments such as certification, traceability, criteria and indicators, market measures against illegal logging, and participatory national forest programmes. The challenge is to maintain this progress, using public funds wisely to achieve specified policy objectives, sharing experience with other sectors, learning from them, improving communication and dialogue, and adapting to the major challenges which face the sector, in the ECE region and elsewhere.

The emerging green economy represents a major opportunity for the ECE region forest sector, which must not be missed. Under the leadership of ECE/FAO, an Action Plan for the forest sector in a green economy is being developed which maps out how the sector could rise to the challenges outlined in this paper.

However, to achieve the ambitious goals of the Action Plan, business as usual in the forest sector is not sufficient: it would lead to missed opportunities, and a possible decline in the relative importance of the sector. All actors and stakeholders, public and private, national and international, should work together to address the challenges identified, in a flexible way, sharing resources and experience, developing innovative approaches, and communicating much better inside the sector, with other sectors and with the general public and policy makers. In this way, the ECE region forest sector can truly achieve its potential contribution to the economic development of the region.

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Forest and Economic Development

A Driver for the Green Economy in the ECE Region

The study reviews the many ways in which forests contribute to economic development in the ECE region, and analyses, on the basis of recent ECE/FAO studies, 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. It concludes that the way forward is to establish forests and the goods and services they provide as an integrated part of the green economy. This is a major opportunity for the ECE region forest sector, which must not be missed. The Action Plan for the ECE region forest sector in a green economy maps out how the sector could rise to the challenges.

