

# *The Way Forward: Four Major Challenges to and Opportunities for Forest Sector Policy in Europe*

## **Introduction**

Parts I and II of the *State of Europe's Forests 2011* described the status and trends using the structure of the pan-European criteria and indicators of sustainable forest management (SFM). The first sections of Part III assessed progress towards SFM, focusing on the country group level and the balance among the criteria. However, there are some major cross sectoral challenges and opportunities for SFM in Europe, which cut across the structure of the indicators and which should be addressed in the light of the outlook for the sector as whole.

This chapter will review four major challenges for the sector: climate change, energy, biodiversity and the green economy. For each, it will outline the challenge, and then systematically present the information relevant to this challenge which has been supplied in the context of SoEF 2011, as a sound factual basis for policy making. It brings together relevant results from the quantitative and qualitative indicators, as well as analysis of other official studies, notably the forthcoming European Forest Sector Outlook Study (EFSOS) to build a picture of the major complex challenges facing the European forest sector. Finally, it will summarise the main challenges and opportunities for policy makers.

All four challenges are exceptionally complex and uncertain and involve actors and policy goals from outside the forest sector. All need analysis far more detailed than is possible in SoEF 2011 - and are indeed being analysed in many different fora. The objective of the present short chapter is to place these complex challenges in the context of broader information on the forest sector and to draw the attention of those responsible for forest sector policy to issues which do not fit well in the conventional policy framework.

## **The forest sector and climate change**

### **The challenge of climate change**

The forest is a major carbon store and sequesters carbon. Wood, which is carbon-neutral when sustainably produced, can replace non-renewable materials and energy, thus helping to mitigate climate change. However, the forest itself is vulnerable to climate change and will need to adapt to a changed climate in the future. The forest sector, therefore, has several potential roles for the mitigation of, and adaptation to, climate change. However, there are trade-offs among the various climate change-related functions, and between them and the many other functions of the forest. To take a very simple example, a single cubic metre of wood cannot be simultaneously a store of carbon and a source of renewable energy. The challenge for the forest sector as a whole is to make a major contribution to climate change mitigation and adaptation, without neglecting the other dimensions of SFM. The formulation of policy is complicated by uncertainty - about the mechanisms of climate change, about the future climate change regime, and about possible strategies for the forest sector.

### **Status and trends for the forest sector and climate change**

From the quantitative and qualitative indicator data collected for this study it is possible to say the following (indicator reference in brackets):

- European forests are a significant carbon pool (1.4).
- This carbon pool has been increasing strongly as growing stock increases (1.2) because fellings are well below increment (3.1), and forest area has been expanding (1.1), although the latter has little

influence on growing stock for the early years of the rotation.

- There are a number of types of damage to the European forest (2.4) and defoliation occurs (2.3). Some of these types of damage (notably fires and storm, but also perhaps defoliation, and damage attributable to droughts) could be negatively affected by a changed climate, although at present knowledge on this is insufficient as a basis for adaptation strategies. The damage itself also results in carbon emissions to the atmosphere, as wood is burnt or decomposed.
- At present, there is significant revenue to forest owners, public and private, from marketed roundwood (3.2), non-wood goods (3.3) and forest services (3.4). In only a very few cases have countries reported revenue from carbon sequestration. If, under a future climate regime, there were significant payments for carbon sequestration by European forests, this would add an option for revenue flow to the present ones. The type of silviculture necessary to maximise carbon sequestration might, however, have a negative impact on other revenues. The changing price structure facing forest owners might influence their management decisions.
- Biodiversity (Criterion 4) is interlinked with climate change in many ways: plantations of single, often introduced, species (4.1, 4.3, 4.4) are said to be less resilient in the case of climate change, although they will probably form part of mitigation strategies as plantations are efficient means to sequester carbon and produce renewable materials and fuels. Adaptation strategies could well involve introducing species outside their natural range to forestall a changing climate. Climate change could raise the threat to species (4.8) and the ecosystems which justify the protection of forest for biodiversity (4.9).
- Climate change would threaten the ability of forest to perform their protective functions (Criterion 5).
- Europe consumes annually about 1 115 million m<sup>3</sup> roundwood equivalent of forest products (6.7): to replace this by non-renewable materials would increase emissions of greenhouse gases and reduce climate change mitigation. Some of these lasting forest products serve as a carbon store ("harvested wood products" in the Kyoto Protocol terminology).
- As Europe is at present a net exporter of forest products (6.8), it is not at present exporting its "carbon footprint" to other regions, although the emerging results of EFSOS suggest that this could change if the high targets for wood energy are to be achieved. There is some uncertainty about the role of further processed wood products, such as furniture or joinery or paper products, as the carbon in these products is not included in the calculation.
- The use of wood as a renewable energy source makes an important contribution to climate change mitigation. At present wood provides about 3.7 percent of Europe's energy consumption, but much

more in certain countries (6.9). Targets have been set, in the EU framework and elsewhere, to raise the share of renewables, as part of climate change policy, as well as for energy security. To achieve these targets would necessitate a significant mobilisation of wood from Europe's forests, trees outside the forest, industries and recovered wood products, as well as major efforts to develop other renewables and energy efficiency.

- There are in place important policies on carbon balance (B.2), which address both climate change mitigation and adaptation. Considerable emphasis is put on carbon sequestration by forests and wood products and the adaptation of forests to climate change impacts. The vital role of forests in reducing GHG emissions and in mitigating and adapting to climate change is not only put forward in national climate and energy policies, but partly also in National Forest Programmes and forest laws. SFM is often reported as a key concept contributing to climate change mitigation. Most countries established specialised entities responsible for implementing various regulations and programmes on climate change, renewable energy and energy efficiency. New national instruments are influenced by recent international climate change debates, agreements and targets.
- EFSOS is constructing a policy scenario outlining the silvicultural measures which would be necessary to maximise carbon stocks in Europe's forests, and the consequences of these assumptions for other parts of the sector.

## **Wood and energy**

### **The challenge of wood and energy**

The promotion of renewable energies, including wood, is a central part of energy and climate change policies all over the region. Evidence has accumulated in recent years that much more wood is being used for energy than previously thought, and that this volume has been increasing, under the influence of policy instruments and, above all, rising energy prices. Most countries, and the EU, have set ambitious targets for renewable energy. This is a positive development for forest owners who have welcomed the emergence of a "third market"<sup>28</sup>, and higher revenue as global energy prices have in effect put a floor under the price for wood fibre, which can no longer fall below its energy value (at least long term, and in accessible regions). These developments have been less welcome to the traditional forest industries, which have to face increasing competition for their raw material.

The challenge to the sector as a whole is to expand strongly the supply of wood energy, from roundwood removals, but also from harvest residues, landscape care wood<sup>29</sup>, industry residues and recovered wood, and to meet the ambitious targets for renewable energy without, however, undermining sustainability as regards wood supply and all other functions, in Europe and elsewhere. Furthermore, wood energy supply and use should be organised for maximum efficiency and minimum waste,

notably using wood as raw material, and recycling it if possible, before energy use (the “cascade” approach), and the energy should be generated efficiently in modern clean plants, with high combustion efficiency (notably thorough combined heat and power) and minimum release of micro-particles, which carry significant risks for human health.

### **Status and trends of wood energy for the forest sector and climate change**

From the quantitative and qualitative indicator data collected for this study, it is possible to say the following (indicator reference in brackets):

- Wood energy contributes 3.7 percent of the final energy consumed in Europe excluding the Russian Federation and 2.5 percent of the total final energy consumption in the region of Forest Europe, but much more in some countries (6.9).
- Wood fibres from forest, other wooded land and trees outside forests remain the most important source for wood energy, followed by residues from wood processing industries, post-consumer recovered wood and processed wood based fuels (6.9).
- The value of marketed woodfuel roundwood (from the forest) in 2010 was nearly EUR 120 million, about a quarter of the value of marketed industrial roundwood (3.2). This does not include the value of other woodfuels, marketed or not.
- Fellings, which include fellings of wood for energy, alongside other assortments, are still well below increment, at the current rate of wood energy supply, in all countries except one (3.1).
- Although the amount of deadwood (considered favourable to biodiversity) varies widely between forest types, data suggest that the amount of deadwood per hectare has slightly increased in most regions over the past 20 years (4.5). Increased use of forest residues and more intensive harvesting for energy could reverse this trend, possibly with negative consequences for biodiversity.
- For the millions of small private forest owners (6.1), local energy markets represent one of the few outlets available for the wood they grow.
- At the policy level (B.4) two-thirds of reporting countries, and the EU, have targets to increase the use of wood for energy. In addition to the forest law, several countries refer to bio-energy, related regulations with regard to the production and use of wood. Furthermore, demand-side measures are mentioned, including renewable energy targets, as means for promoting use of wood.

An important question, to which SoEF 2011 does not provide an answer, is how much wood could realistically be supplied, on a sustainable basis, for energy in Europe. Would this be enough to meet the renewable energy targets

and what would be the consequences of higher wood energy supply for the sector as whole? These questions have been addressed in the EUwood project (Mantau, 2010), of which UNECE/FAO was a partner. In summary, it will probably be possible to meet the wood part of the renewable energy targets in 2020 without harming the wood supply of the traditional industries, if a number of conditions are fulfilled: energy efficiency targets must be met, other renewable energies must grow faster than wood, and there must be an exceptional mobilisation strategy, with long-term commitment and investment, a comprehensive approach, numerous specific policy measures and favourable framework conditions (Prins, 2010). For 2030, even with the high mobilisation described above, it would be difficult to meet the energy targets without affecting wood supply to the industries or importing large volumes from outside Europe. Such high mobilisation would be quite different from today’s forest management, especially in areas where at present forest management is not very intensive. High mobilisation of wood to meet ambitious energy targets would certainly have multiple consequences, on rural income, on silviculture and on biodiversity.

### **Conservation of forest biodiversity**

#### **The challenge for conservation of forest biodiversity**

The Convention on Biological Diversity’s objective is to achieve a significant reduction in the rate of biodiversity loss, while the EU’s target is to halt biodiversity loss in the EU by 2020. Forest Europe ministers made commitments in the field of biodiversity in 1993 and 2003. Many countries have similar objectives. These targets are usually translated into strategies and plans, which naturally include forest biodiversity alongside other biodiversity. Over the past decades in Europe, large areas of forest have been protected for the conservation of biodiversity; regulations and guidelines have influenced forestry practice to make it more friendly to biodiversity. However, biodiversity is very difficult to measure directly, so it is not clear, despite intense efforts to monitor trends, whether the measures taken have achieved their objectives and whether they are sufficient to halt the loss of Europe’s forest biodiversity. The challenge is not only to conserve biodiversity but to do it in an efficient and flexible way, using sophisticated policy instruments, including payment for ecosystem services, informational means, certification, etc., in addition to regulation and the creation of protected areas.

#### **Status and trends for forest biodiversity**

From the quantitative and qualitative indicator data collected for this study, it is possible to say the following (indicator reference in brackets):

- Over the last 10 years, the area of Europe’s forests designated for biodiversity and landscape protection (4.9) has increased by half a million ha annually. About 10 percent of European forests is

<sup>28</sup> In addition to sawlogs and pulpwood.

<sup>29</sup> Wood arising from operations like urban forestry, road maintenance, orchard tending, etc.

protected with the main objective of conserving biodiversity and about 9 percent with the main objective of protecting landscape, which accounts for an area of 39 million ha. The strictness of protection for biodiversity varies considerably within Europe.

- About 87 percent of the European forests, excluding the Russian Federation, is classified as semi-natural (4.3). In the Russian Federation, 32 percent of the forest is “undisturbed by man”.
- Nearly 70 percent of the total forest area in Europe, excluding the Russian Federation, is regenerated naturally or through natural expansion (4.2). Natural regeneration is expanding in Central European regions, while in other European regions planting and afforestation are the most used annual regeneration types.
- The area dominated by introduced tree species (4.4) increased slightly in absolute numbers from 2005 to 2010 in Europe (excluding the Russian Federation, which has a negligible area of introduced tree species) and covers around 9 million ha or 4 percent of the forest area. No noticeable changes have been observed over the last 10 years. A small proportion of the total forest area, one million ha, is occupied by tree species considered invasive, notably *Robinia pseudoacacia* in central Europe.
- About 70 percent of the forests in Europe is dominated by two or more tree species, and the remaining 30 percent is dominated by one tree species alone, mainly coniferous (4.1). The area of forest that consists of a single tree species has decreased annually during the last 15-year period by around 0.6 percent. In some areas such as the boreal forest, single species stands are often the natural norm, while elsewhere they indicate more intensive, production-oriented silviculture.
- Data suggest that the amount of deadwood (4.5), particularly standing deadwood, has been slightly increasing in most of Europe’s regions over the past 20 years. However, the amount of deadwood per hectare varies considerably. The SoEF results indicate that the change in forest practices towards more nature-oriented management can be observed in forest characteristics.
- In 2010, a total of 446 000 ha and 7 700 ha of forests were managed for in situ and ex situ gene conservation, respectively, and 860 000 ha for seed production in Europe excluding the Russian Federation (4.6). The areas managed for ex situ conservation and seed production increased during the period 1990- 2010.
- Trends in forest connectivity in the landscape context (4.7) have been assessed and are reported by country for the first time. It is possible to identify regions with large forest connectivity loss caused by fire and transport infrastructure construction. Results indicate that expansion of forest area after natural succession or restoration in a given region does not necessarily increase the connectivity.
- More information than before was supplied on threatened forest species, but the information is not yet comparable and it is not yet possible to identify trends (4.8).
- It is important to monitor trends for the biodiversity of specific forest types as these trends can be masked by overall average developments over all forest types. Between 7 and 10 countries are able to report on a pilot basis on three biodiversity indicators by forest type.
- Trends in health and vitality of forests (Criterion 2) may influence forest biodiversity, when they move beyond the range of naturally occurring damage, for instance because of climate change or pollution.
- Marketed forest services (3.4) include biodiversity-related services, marketed either to governments or to environmental organisations. However, little is known about this aspect as yet.
- Most European forests are under a management plan or an equivalent (3.5), which typically includes management of the biodiversity of the forest in question.
- The large number of small private holdings in Europe (6.1) makes it difficult to manage forests for conservation of biodiversity, through lack of resources and knowledge and because the scale of management is too small to correspond to biodiversity needs. However, lightly managed or unmanaged forests, which are common on small holdings, are often positive for biodiversity.
- Although data on forest visits (6.10) are weak, it is clear that recreation of all types is the major function for many forests near urban areas or where tourism is important. High intensity of recreation use can threaten biodiversity (e.g. through trampling vegetation and disturbing wildlife) but also can encourage managers to maintain “attractive” forests, with characteristics which are often biodiversity-friendly (varied species, old stands, openings etc.). It is often possible to provide recreation and biodiversity functions simultaneously.
- With regard to policy on biodiversity (B.6), measures are being taken to encourage deadwood accumulation. Although several countries have quantified targets regarding forest protected areas, in most cases, the level of protection remained unclear. Several countries highlight integrated management, or the concept of SFM, as the overall approach to better contribute to forest biodiversity conservation and management. Countries with important forest sectors highlighted programmes to promote the conservation and use of forest genetic resources. While the institutional framework remains stable, the legal frameworks towards biodiversity have been subject to amendments in several countries and financial instruments seem to be of higher importance than before. In particular private forest owners ask for adequate incentives or compensation schemes to conserve biodiversity.

## Sustainable forest management in a green economy

### Challenges for the forest sector in a green economy

According to UNEP (UNEP, 2011), a green economy is one that “results in ‘improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.’ In its simplest expression, a green economy is low carbon, resource efficient, and socially inclusive. In a green economy, growth in income and employment should be driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services.” (UNEP, 2011) A green economy is considered one of several ways to achieve sustainable development, not the only way.

Many would consider that the European forest sector at present displays many of the characteristics of a green economy. The results of SoEF 2011 which are summarised below seem to confirm that the sector is indeed low carbon, resource efficient and, at least in part, socially inclusive. However, the European forest sector functions in an economy which is not “green”; economic incentives and mechanisms inside the sector, of necessity, follow the general rules, with many ecosystem services provided without explicit compensation and many distortions of price relationships. Agriculture, fossil fuels, and many non-renewable materials cause significant environmental, even social, damage, which are not reflected in their final cost, as they are borne by society as a whole. It is likely – although this still needs to be demonstrated – that the full life-cycle cost of sustainably produced wood products is less than that of competing materials and fuels.

The challenge for the European forest sector is to develop further those aspects which are part of the green economy, such as green jobs, sustainable consumption patterns, recycling and recovery, increased supply of renewable energy and ecosystem services. This will involve innovation as regards products, processes and services as well as business models, and much improved communication. In addition, it should promote these practices throughout the economy and society, both to share its experience and to work towards a more level playing field between the forest sector and its competitors for land capital and human resources.

### Status and trends relevant to the forest sector in a green economy

From the available data for quantitative and qualitative indicators, it is possible to say in which ways the European forest sector has the characteristics of a green economy: carbon neutral, resource efficient and socially inclusive (references to indicators in brackets).

The European forest sector has the following characteristics which may be considered *carbon neutral* or tending in that direction:

- The carbon stock in forests has been increasing steadily (1.4).
- Fellings are below increment, so the European forest remains a carbon sink as growing stock increases (31, 1.2).

- Europe consumes large volumes of forest products (6.7). As these are mostly from renewable sources, if they were replaced by other materials, the emissions of greenhouse gases over the whole life-cycle would probably be much higher.
- As Europe is a net exporter of forest products (6.8), it does not export its carbon footprint for forest products to other regions.
- It produces and consumes large amounts of wood-based energy (6.9) which substitute for fossil fuels.
- At the policy level (B.2), considerable emphasis is put on mitigation of climate change, notably through carbon sequestration by forests and wood products, and on the adaptation of forests to climate change impacts. The vital role of forests in reducing greenhouse gas emissions and in mitigating and adapting to climate change is not only put forward in national climate and energy policies, but partly also in National Forest Programmes and forest laws. SFM is often reported as a key concept contributing to climate change mitigation.

The European forest sector has the following characteristics which may be considered *resource efficient*, in that all the wood is used, and there is practically no waste during processing or after consumption (most of the analysis is taken from the EUwood project):

- Most of the residues of the forest industries are used as raw material or source of energy (Saal, 2010; Steierer, 2010).
- Forest products (both paper and solid wood products) are recovered for use as raw material or energy (Leek, 2010). There is scope for expanding the collection of recovered wood products, which would otherwise enter the solid waste stream. Recovered paper is nearing the technical limits of recovery, although some improvement is considered possible.
- Large parts of the forest industries are energy self-sufficient or net energy suppliers through use of their own residues (black liquor, bark etc.) as sources of energy. Increasingly pulp mills work on a closed circuit principle, releasing minimum amounts of solid and liquid waste into the environment.
- Modern wood burning plants are very efficient, with high combustion efficiency and low release of pollutants. Older, smaller plants, however, are often less efficient and may release micro-particles which are harmful to health.

The European forest sector has the following characteristics which may be considered *socially inclusive*:

- There are many millions of private forest owners in Europe (6.1). About half the forests are publicly owned, sometimes by central government, but also by subnational and municipal governments. In this way, most of the European population is concerned, directly (as forest owners) or indirectly (as citizens),

with forest ownership and management and feel that the nation's forests are, in a real sense "their" forests.

- Nearly four million people work in the forest sector, although this number has been declining steadily (6.5).
- The forest sector contributes to the national income (about 1 percent on average, but much more in some countries) (6.2).
- Almost all forests are accessible for recreation (unlike most agricultural or urban areas) and some forests are intensive providers of recreation (6.10).
- Forest sites with cultural and spiritual values are increasingly being identified, listed and protected (6.11).
- At the policy level (B.9), employment in the forest and forest-based sector is an important indicator for the social benefits generated by forests, especially for sustainable rural development.
- At the policy level (B.10), raising the awareness of society about the multi-functional role of forests, particularly drawing attention to protection and socio-economic functions, and the contribution of forests to the quality of life in general is a widely declared target. Compared to 2007, more countries highlight public and multi stakeholder participation as a crucial tool in forest policy, management and decision making processes. In addition, a few countries specified the objective of ensuring and/or improving transparency as a principle of good forest governance.
- At the policy level (B.11), a common goal among Forest Europe signatories is to maintain and preserve the international and national heritage of cultural and historical sites and monuments. The integration of cultural and spiritual forest values into different land-uses such as forestry, recreation and tourism activities, as well as the enhancement of its contribution to rural development, is highlighted as a main policy objective by several countries.

A few examples are reported of mechanisms in the forest sector which may be considered to be characteristic of the green economy:

- Some forest ecosystem services are already marketed. The reported value of marketed forest services was nearly EUR 900 million: this includes biospheric services (e.g. for gene conservation or nature protection on a voluntary contractual basis or carbon sequestration-related afforestation projects). Even though data on marketed services are very limited, they represent at present a non-negligible income for forest owners and could probably be increased (3.4).
- Many European governments compensate forest owners for supplying ecosystem services, although often the link between the service provided and the payment (often a per hectare subsidy) is tenuous. 19 countries reported on government expenditure for forest services (6.4), which includes payment for biospheric or ecological services. However, the data

are not very comparable and have not been fully analysed yet.

## **Conclusions and recommendations**

*The following conclusions and recommendations summarises policy challenges and opportunities on four thematic elements elaborated in more detail above.*

### **Climate change**

The forest sector has several potential roles for the mitigation of climate change, including carbon storage and sequestration, substitution of non-renewable materials and energy. The forest is also vulnerable to climate change and needs to adapt to a future changed climate. However, there are trade-offs among these climate change-related functions, and with the many other functions of the forest.

The main challenge is to map out, discuss, negotiate and then implement an agreed balance among the various forest functions in the context of a changing climate and thereby enable the forest sector to make the largest possible contribution to combating climate change, while maintaining the best possible combination of the other forest functions. This is made more challenging by the weakness of the knowledge base about forests and climate change, and low awareness of the main issues, so rational policy making is difficult. Topics on which research is urgently needed include development of strategies for climate change adaptation and proactive risk management, wood mobilisation, and the consequences of more intensive forest use for non-wood functions, life cycle analysis of all parts of the system (to compare wood to non-wood products, and to optimise the cascade approach to the sound use of wood).

However, the main challenge is institutional: to incorporate SFM issues into the climate change negotiations (which are already very complex) and to avoid legally-binding solutions which unduly favour one forest function (carbon sequestration) over all the others. Finding non-distorting price formation mechanisms for carbon, energy and forest ecosystem services should be an integral part of a rational and market-based solution. After these complex policy development challenges, it will be necessary to find effective and equitable ways of implementing the decisions.

### **Wood and energy**

The report shows that wood energy plays a major role in the sector and in national energy supply, but that this role is expected to grow significantly in order to expand the share of renewable energies. The results from the EUwood project show that it will probably be possible to meet the wood part of the renewable energy targets in 2020 without harming the wood supply of the traditional industries, but only if a number of conditions are fulfilled, notably an exceptional mobilisation strategy. Such high mobilisation would be quite different from today's forest management, especially in areas where, at present, forest management is not very intensive. High mobilisation of wood to meet ambitious energy targets would certainly have multiple consequences, notably on rural income, on silviculture and on biodiversity.

If wood energy is to play a strong role in climate change mitigation and energy security, indeed in a broader sustainable development perspective, the supply of wood for energy must be brought to the centre of forest sector policy. This would enable a significantly higher mobilisation of wood supply than at present, from the forest (higher removals, more use of harvesting residues, possibly expansion of forest area and establishment of short rotation plantations), but also from industry residues, landscape care wood and recovered wood products. A higher energy price would facilitate this structural shift, but is not enough in itself. A series of policy measures and actions by all stakeholders have been identified (FOREST EUROPE Liaison Unit Oslo, DG Agriculture and Rural Development, UNECE/FAO, 2010; Prins, 2010) and would have to be implemented. Key elements would be changing the behaviour of small forest owners, by modifying the institutional framework and by financial incentives, as well as significantly increasing the use of harvest residues, even, in some areas, stumps.

However, the single-minded pursuit of wood mobilisation for energy is not sufficient, and probably not truly sustainable, by itself. A major policy challenge, as with climate change, is to reconcile the objective of increased wood energy supply with the other dimensions of SFM. The positive effects of increased wood mobilisation on the carbon cycle, energy security and forest owners' income would have to be weighed against possible negative consequences for forest biodiversity and the wood supply for traditional forest industries, as well as the considerable economic and political cost of implementing the wood mobilisation measures. There are many specific and/or local win-win solutions, which must be identified and implemented. Nevertheless, some trade-offs are inevitable, especially if a high level of mobilisation is to be achieved. The challenge is to resolve these trade-offs while maintaining public support and thus help the forest sector to make a full contribution to sustainable development as a whole. This may require better ways of policy coordination, minimising conflict and competition between, for instance, energy policy and forest policy, or climate change policy and biodiversity policy.

### Conservation of biodiversity

There is general agreement that biodiversity conservation is at the heart of SFM, and that it must be encouraged, within and outside protected forest areas. However there are problems with monitoring trends for biodiversity (as opposed to recording measures intended to promote biodiversity), and it is hard to say whether the objective of halting biodiversity loss is truly being achieved. It is also accepted that forest and biodiversity policy should be integrated. In this respect there has been progress: for instance, most national forest programmes refer to national biodiversity action plans. Nevertheless, the efficiency of these programmes is hard to measure, and while forest owners seek incentives to conserve biodiversity, public budgets are under intense pressure.

Setting aside temporarily the challenges of measuring progress in biodiversity conservation and of developing

appropriate policy instruments, there remain major questions about long-term strategic objectives in the field of forest biodiversity:

- When biodiversity loss has been halted, should the status quo be maintained indefinitely, or should measures be taken to reverse the trend, for instance by increasing protected areas, creating transcontinental wild life corridors, reintroducing major predators, etc.? If so, there would be consequences for other parts of the forest sector.
- If the future is marked by more intensive silviculture, higher wood prices and higher harvests, notably for energy use, as foreseen in the previous section, would this halt, or even reverse, the improvement in the situation for biodiversity?

Both these questions require policy decisions which involve many actors outside the forest sector, and must weigh the importance of different policy objectives. They also require much better information than available at present on the long-term consequences of such policy decisions, as well as new policy instruments. There are many different approaches to explore further, including flexible incentives for biodiversity conservation, such as payment for ecosystem services, which deliver "more biodiversity for less public funds".

### The European forest sector in a green economy

The European forest sector already displays many of the characteristics of a green economy. This study has shown that it is to a large extent low-carbon and resource efficient and, at least in part, socially inclusive. However, it must function in an economy which is not "green". For instance the negative externalities of sectors with which the forest sector must compete for land, capital and human resources, including agriculture and the supply of fossil fuels and non-renewable materials, are large and probably less included in their final cost than is the case for forest products and services.

The results mentioned above would seem to indicate that the European forest sector has the potential to play a major, even exemplary, role in the green economy, as it is fundamentally low carbon and resource efficient. To achieve this potential, its "green" features would need to be further developed by, for instance, promoting sustainable production and consumption patterns, green building, green jobs in the sector, and the supply of renewable energy. Payment for ecosystem services also should be developed, beyond the simple possibly inefficient systems in place at present. An Action Plan for the forest sector in the green economy is at present being developed by the UNECE Timber Committee and the FAO European Forestry Commission.

Finally the system of criteria and indicators for SFM, with regular monitoring, on which this report is based, is a good example of the type of monitoring system which will be necessary if a green economy is to be created. The experience from the forest sector in this respect should be shared with other sectors.