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GREEN PAPER

**On Forest Protection and Information in the EU:
Preparing forests for climate change**

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On Forest Protection and Information in the EU: Preparing forests for climate change

1. INTRODUCTION

The purpose of this Green Paper is to launch the debate on options for a European Union (EU) approach to forest protection and information in the framework of the EU Forest Action Plan, as announced by the Commission in the White Paper "Adapting to Climate Change: towards a European Framework for action"¹. The Council conclusions of 25 June 2009 on this White Paper underlined that climate change has had and will have an impact, inter alia, on forests. As these impacts will have socio-economic and environmental consequences, it is opportune to prepare now so that EU forests can continue to perform all their functions under changing climatic conditions.

In this context, forest protection in the EU should aim at ensuring that forests continue to perform all their productive, socio-economic and environmental functions in the future.

Competence for forest policy lies primarily with the Member States, (MS) under the subsidiarity principle². The role of the EU is limited and designed principally to add value to national forest policies and programs by:

- monitoring and possibly reporting on the state of EU forests,
- anticipating global trends and drawing MS' attention to emerging challenges and,
- proposing and possibly coordinating or supporting options for early action at EU scale.
- The debate launched by this paper should therefore focus on how climate change modifies the terms of forest management and protection in Europe and how the EU policy should evolve to enhance its contribution to MS' forest-related initiatives. What challenges do we face, how can the EU help address them, what are our additional information needs?

Globally, the importance of protecting forests and managing them sustainably has been acknowledged since the United Nations Conference on Environment and Development in 1992 adopted the "Rio forest principles"³. The United Nations Framework Convention on Climate Change (UNFCCC) recognizes the importance of forests in the global greenhouse gas (GHG) balance and the Convention on

¹ COM(2009)147

² Art. 5 of the EU Treaty

³ UNCED report (Rio de Janeiro, 1992)Annex III, 2b

Biological Diversity (CBD⁴) addresses forest biodiversity through an expanded work programme. The United Nations Convention to Combat Desertification (UNCCD) also acknowledges the important contribution of forests to the achievement of its goals.

At international level, the EU is contributing to better forest protection through the Forest Law Enforcement Governance and Trade Action Plan⁵ and an initiative in the context of reducing emissions from deforestation and forest degradation⁶, which contributes to the post-2012 discussions under the UNFCCC.

At pan-European level, the Ministerial Conference on the Protection of Forests in Europe (MCPFE)⁷ defined, in 1993, sustainable forest management (SFM) as "The stewardship and use of forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national and global levels, and that does not cause damage to other ecosystems". Subsequent conferences⁸ have produced recommendations for SFM and forest protection as well as criteria and indicators for national reporting. All EU MS and the Commission have signed the MCPFE resolutions confirming SFM and multi-functionality as the core approach to forestry.

At EU level, the Forestry Strategy (FS) for the EU⁹ sets out common principles of EU forestry – SFM and multi-functionality - and lists international processes and activities to be followed at EU level. The EU Forest Action Plan (FAP)¹⁰ builds on the FS and serves as a coordination tool for forest related activities and policies at EU level. It aims, *inter alia*, to maintain and appropriately enhance biodiversity, carbon sequestration, integrity, health and resilience of forest ecosystems at multiple geographical scales because well functioning forest ecosystems are key to maintaining productive capacity. It foresees working towards a European forest monitoring system and enhancing the protection of EU forests.

This Green Paper

- identifies briefly the general situation and global relevance of forests;
- describes the characteristics of EU forests and their functions;
- identifies the main challenges faced by EU forests in a changing climate and how they could compromise forest functions;
- presents an overview of the tools available to ensure forest protection, and of the existing forest information systems that could be used to address the challenges and monitor environmental impacts and effects of actions.

⁴ <http://www.cbd.int/forest/pow.shtml>

⁵ COM (2003) 251 -Council Regulation (EC) No 2173/2005

⁶ COM (2008) 645

⁷ <http://www.mcpfe.org>

⁸ Lisbon MCPFE (1998)

Vienna MCPFE (2003)

⁹ Council Resolution (OJ 1999/C 56/01)

¹⁰ COM (2006)302

In addition, it raises a series of questions relevant to developing options for future forest protection and information in the EU under a changing climate. The responses from EU institutions, MS, EU citizens and other interested stakeholders will inform and guide Commission considerations regarding any additional action at EU level to better prepare EU forests for climate change, and enhance the fulfilment of their functions. It may also provide input for discussions concerning the possible update of the EU Forest Strategy on climate related aspects.

2. THE STATE OF FORESTS – FOREST FUNCTIONS

2.1. What is a forest?

While there is no common definition agreed among EU MS of what constitutes a forest, the definitions used by the Food and Agriculture Organization (FAO) and the United Nations Economic Commission for Europe (UNECE)¹¹ in their periodic assessments of forest resources and also by the MCPFE provide an adequate working description for the purpose of reflecting on forest protection.

"Forest": Land with tree crown cover (or equivalent stocking level) of more than 10 percent and area of more than 0.5 ha. The trees should be able to reach a minimum height of 5 m at maturity in situ.

"Other wooded land" (OWL): Land either with a tree crown cover (or equivalent stocking level) of 5-10 percent of trees able to reach a height of 5 m at maturity in situ; or a crown cover (or equivalent stocking level) of more than 10 percent of trees not able to reach a height of 5 m at maturity in situ and shrub or bush cover.

2.2. Forest cover

Worldwide, historical demand for land, timber products and energy has removed a large part of the Earth's original forest cover, most of it during the 20th century. Forests now cover less than 30 % of the Earth's land surface and are steadily decreasing in area¹². Current deforestation, mostly in developing countries, and other related land use changes still cause about 12-15 % of global CO₂ emissions¹³.

Most European land was once covered by forests. Since human settlement began, forest area and composition have been gradually but substantially influenced by man over a period of several thousand years¹⁴. The majority of EU forests now consist of semi-natural stands and plantations of indigenous or introduced species.

The EU currently contains 5 % of the world's forests and EU forests have continuously expanded for over 60 years, although recently at a lower rate. EU Forests and OWL now cover 155 million ha and 21 million ha, respectively, together

¹¹ <http://www.unece.org/timber/fra/definit.htm>

¹² Global deforestation rate is ca. 13 M ha per year see <http://www.fao.org/DOCREP/008/a0400e/a0400e00.htm> for up to date figures.

¹³ G. R. van der Werf et al: *CO2 emissions from forest loss*, Nature Geoscience (2), 2009

¹⁴ Falinski, J.-B.; Mortier, F., *Revue forestière française* XLVIII, 1996.

more than 42 % of EU land area¹⁵. Most of EU forests, including those under continuous management, have also grown in terms of wood volume and carbon stock, thus effectively removing CO₂ from the atmosphere.

2.3. Forest functions

Forests are among the most bio-diverse terrestrial ecosystems. In healthy, biologically diverse forests this complexity allows organisms and their populations to adapt to changing environmental conditions and to retain overall stability of the ecosystem¹⁶. Forests grow slowly: trees take years to regenerate, decades to grow and the final use of young stands is sometimes difficult to predict when they are established.

Forests serve multiple and interrelated social, economic and environmental functions, often at the same time and place. Safeguarding such multi-functionality requires balanced management approaches based on adequate forest information.

2.3.1. Socio-economic functions

2.3.1.1. Forests provide jobs, income and raw materials for industry and for renewable energy.

While EU forest owners estimate their number at 16 million¹⁷, about 350.000 people are directly employed in forest management. The main income from most forest holdings depends on wood production. Primary forest-based industries (FBI) provide sawn wood, wood-based panels, pulp for paper, firewood as well as forest chips and bark for bio-energy, accounting for more than 2 million jobs, often in rural small and medium enterprises, and a €300 billion turnover¹⁸. The European Forest Sector Outlook Study report¹⁹ has called for improving the appeal, training opportunities and security standards of forest jobs.

Wood supports a large downstream value chain including industries such as furniture, construction, printing and packaging. The forest sector provides around 8 % of the total added value from manufacturing. The economic importance of the sector in rural areas is very high as sustainably managed forests build the backbone of the provision of wood to the FBI. Forest based raw materials, goods and services can also be one of the most important bases for economic recovery and "green growth" in rural areas.

Wood production for industry steadily increased from 1950 to 1990 in Western Europe and then levelled out until 2000. Despite higher costs for processing small timber and required changes in forest management, this trend was possible due to new processing and manufacturing technologies, especially in the 1970s and 1980s²⁰

¹⁵ TBFRA 2000 - <http://www.unece.org/timber/fra/welcome.htm>

¹⁶ SEC(2009)387, section 10.2 "Forests"

¹⁷ <http://www.cepf-eu.org>

¹⁸ SEC(2009)1111:

¹⁹ <http://www.unece.org/timber/efsos/>

²⁰ <http://www.unece.org/timber/efsos/>

and later, increasing paper recycling²¹. A similar trend occurred in Eastern Europe with the levelling beginning around 1985.

However, against a backcloth of forest expansion and higher per hectare stocking rates, the EU forest utilisation rate, measured as the ratio of felling to increment, declined overall from 1950²² until early this century. Since then, increase in demand for wood products has been supplemented by that from bio-energy developments.

There is potential to further increase sustainable wood mobilisation within the EU, while paying due attention to all other forest functions. But balancing issues of competitiveness of the forest based industries, economic viability, environment, fragmentation of ownership, organisation and motivation of forest owners poses considerable challenges and will require further information efforts.

Reaching the 20 % renewable energy share objective of the EU Climate and Energy Package could multiply total biomass demand from agriculture and forests by a factor 2 to 3²³, including a substantial increase in efficiency of biomass production and use.

Projections made by the UN-ECE and FAO²⁴ suggest a possible imbalance between supply and demand to meet existing material use and extrapolated renewable energy needs, if the importance of wood in the biomass component of the total renewable energy supply remains constant.

Under this scenario it has been estimated²⁵ that, due to steadily growing demand, the ratio of fellings over net annual increment could temporarily increase in some European countries to over 100 %, causing a decline in growing stock after 2020. While a temporary high utilisation rate is not necessarily unsustainable, given that the forest age-class structure is positively skewed in many MS, it could turn forests from a carbon sink into a temporary source. Raising utilisation rates may also help to decrease instability of aging stands, saturation effects in old forests and vulnerability to forest fires, storms and pests thereby counteracting the risk that EU forests turn into a carbon source.

Targeted and timely forest information will be crucial for determining the role wood can play as a raw material for the wood-processing industry and for energy generation. Under the above scenario, maintaining the potential for sustainable wood supply will require:

- Developing new domestic sources of wood, notably through expansion of the area used to grow and harvest wood;
- Mobilising wood from existing domestic sources (forest and non-forest), e.g. through higher wood removals;

²¹ COM(2008)113

²² Häglund, B.: *The role of European forests in welfare creation*, STORA ENSO presentation , 2003

²³ COM (2006)848

²⁴ www.unece.org/timber/docs/dp/dp-41.pdf

²⁵ Hetsch S. et al (2008): Wood resources availability and demands II -future wood flows in the forest and energy sector. European countries in 2010 and 2020,Geneva

- Increasing efficiency in the production and the use of wood;
- Increasing imports of wood raw materials.

Achieving the above while retaining or enhancing all other forest functions will pose new challenges for SFM at all levels. In the light of adaptation of forests to climate change this could include restructuring measures like changes in tree composition as well as more frequent and early thinnings, depending on the local situation.

In addition to wood products, non-wood goods and services provide, in some European regions, more revenue than wood sales²⁶. Innovative methods for the valuation of non marketed forest products and services have been investigated by the Commission²⁷. Biodiversity protection, recreation, carbon sequestration and watershed services are the most important non-market services but are generally unrewarded due to the fact that they often have the status of public goods.

2.3.1.2. Forests protect settlements and infrastructure,

Forests are a key component of the European landscape. Many mountain areas in Europe would be uninhabitable without forests that prevent landslides, mudflows, rock fall and avalanches from affecting roads, railways, cultivated areas and entire settlements. Such protective forests have to be especially managed to provide a stable and continuous vegetation cover. In Austria, 19 % of the total forest area has been designated by the 1975 Forest Act protective forests. French forest legislation distinguishes between several types of protective forests: "*forêts de montagne, forêt alluviale, forêt périurbaine ou littorale*".

Forests managed for amenity purposes (including seldom marketed amenities such as hunting, recreation, landscape value, berry and mushroom picking) raise the value of neighbouring estates, encourage tourism, contribute to health and well-being and are part of European cultural heritage.

2.3.2. *Environmental functions – ecosystem services*

2.3.2.1. Forests protect soil

Forest areas play a role in preserving landscapes and soil fertility. Forests prevent soil erosion and desertification especially in mountains or semi arid areas, mostly by limiting runoff and lowering wind speed. They also deepen and enrich²⁸ the soils upon which they grow due to their coarse and fine roots, which increase the weathering of rocks and whose degradation is a major source of soil organic matter (SOM), and so contribute to soil fertility, productivity and carbon sequestration. Efforts in afforestation and reforestation, leading to an increasing forest area in the EU, as well as natural regeneration, growing shares of mixed forests and soil friendly harvesting machinery support this function. On the other hand, intensification measures such as shortening of rotations and use of forest logging residues, stumps

²⁶ MCPFE "State of Europe's forests 2007"

²⁷ http://ec.europa.eu/agriculture/analysis/external/forest_products

²⁸ SOM varies from 0,71 % in arid agricultural land to 6,65 % in humid (Vallejo, R. et al (2005) MMA - Spain)

and roots can damage and impoverish soils, and cause additional GHG emissions under certain site conditions²⁹ and depending on the local situation.

2.3.2.2. Forests regulate freshwater supplies

Forests play a major role in the storage, purification and release of water to surface water bodies and subsurface aquifers. Their purification role, including that of forest soils³⁰, includes breaking down or absorbing most air pollutants carried by rain. Their soils buffer large quantities of water, reducing flooding. Many MS make use of the water regulating role of forests in the provision of drinking water. In Belgium, water from the Ardennes forest area is the principal supply source for Brussels and Flanders. In Germany, two thirds of the "*Wasserschutzgebiete*"³¹ for abstraction of high quality drinking water is under forest cover. In Spain, forests in upper river catchments have been given special conservation status because of their capacity to improve water quality.

2.3.2.3. Forests conserve biodiversity

Forests are a key component of European nature and they are home to the largest number of vertebrates on the continent. Several dominant tree species (e.g. European beech and holm oak) are virtually restricted to Europe, giving European forests a distinctive nature. Thousands of species of insects and invertebrates as well as many plants are confined to forest habitats primarily constituted by these trees. Biodiversity conservation (from genetics to landscape scales) improves forest resilience and adaptive capacity³². Forest habitat types designated as Natura 2000 sites cover over 14 million ha, constituting almost 20 % of the whole terrestrial Natura 2000 network.

Forests undisturbed by man^{33,34}, account for about 9 million ha, ca 5 % of total forest area in the EEA region³⁵. Such forest habitats have been the source of many of the cultivated plants, wild fruits, and medicines in use today and should continue to fulfil that function for future generations. Forests in SE Europe, Fenno-Scandia and the Baltic area are strongholds of large carnivores such as the wolf, bear and lynx which are mostly extinct elsewhere in the EU.

Active forest management can create more diverse habitat structures, by mimicking natural disturbances, which in turn can favour higher species diversity³⁶, in comparison to no management.

The recent Commission assessment of the conservation status of Europe's most vulnerable habitats and species protected under the Habitats Directive³⁷ indicates that grassland, wetland and coastal habitat types are under most pressure, while one third

²⁹ <http://www.forestry.gov.uk/website/forestresearch.nsf/ByUnique/INFD-623HXH>

³⁰ EEA report 8/2009.

³¹ "Water Protection Areas" Bayerischer Agrarbericht 2008

³² http://ec.europa.eu/environment/nature/info/pubs/docs/nat2000/n2kforest_en.pdf

³³ TBFRA 2000-<http://www.unece.org/trade/timber/fra/welcome.htm>.

³⁴ MCPFE "State of Europe's Forests 2007"

³⁵ EU Member States, Iceland, Norway, Switzerland, Liechtenstein and Turkey

³⁶ Tomialojc and Wesolowski (2000). Biogeography ecology and forest bird communities

³⁷ COM (2009) 358

of forest habitats of Community interest³⁸ are in a favourable conservation status. But this situation is quite regionally varied and general trends are not evident. Reporting on the EU's 2010 biodiversity target indicates that certain forest bird populations, have now stabilized after decline, while deadwood remains below optimal levels from a biodiversity perspective in most European countries³⁹. It also has to be noted that some challenges to forest biodiversity can originate outside the forest sector.

Recent biodiversity monitoring of forests at EU level⁴⁰ has provided a baseline with harmonized and comparable information on tree species richness, stand structure, forest types, deadwood, and ground vegetation. Results include the fact that most of the surveyed forests are between 60-80 years old and are mainly composed of one to two tree species, occasionally reaching more than 10. However, it should also be kept in mind that overall biodiversity is known to depend not only on tree species but as well on stand structure and resulting light conditions.

2.3.3. *The role of forests in climate regulation*

2.3.3.1. Forests as sinks and sources of carbon

Forests are an essential link in the global carbon cycle because of their capacity to remove CO₂ from the atmosphere and to store it in their biomass and soil thus acting as a sink. Their growth counteracts rising GHG concentrations in the atmosphere. On the other hand, forest degradation and/or conversion to other land use can cause substantial GHG emissions due to fires, biomass decay and/or mineralisation of SOM, leading to forests becoming a CO₂ source.

National forest inventories (NFI) are the most important data sources for the estimation of whether forest are sinks or sources of CO₂. Currently, NFIs indicate that EU forest increment is higher than fellings. On this basis, EU forests accumulate carbon and therefore “forest land” currently acts as a net carbon sink⁴¹: It removes ca. 0.5 Gt of CO₂/yr, compared to EU-27 industrial GHG emissions of 5 Gt CO₂ equivalent /yr⁴². However, the combined effects of climate change (e.g. more frequent very strong storms⁴³), prevalence of older stands and possible unforeseen increases in timber harvesting may have an impact on this sink capacity.

In this context, it is important that forests can provide renewable materials and energy which can be used as a substitute for more carbon intensive products and energy sources. More carbon in standing timber and wood products as well as reduced utilisation of fossil fuels means less GHG in the atmosphere.

In the long term, a sustainable forest management strategy aimed at maintaining or increasing forest carbon stocks while producing an annual sustained yield of timber, fibre or energy is expected to generate the largest sustained mitigation benefit⁴⁴.

38 Art. 17 HD report 2009 - <http://ec.europa.eu/environment/nature/>

39 EEA Rep.n°4/2009

40 BioSoil project / "Forest Focus"

41 Ciaï, P. et al. (2008): <http://www.nature.com/ngeo/journal/v1/n7/full/ngeo233.html>

42 Annual European Community greenhouse gas inventory 1990–2007 and inventory report 2009

43 Lindroth, A. et al in Global Change Biology 2009-15

44 <http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter9.pdf>

2.3.3.2. Forests as regulators of local and regional weather

Evapo-transpiration by all vegetation is responsible for about 2/3 of total water injection from land to air⁴⁵. Forests not only store but also evaporate huge amounts of water, complementing the flux of oceanic moisture moving inland⁴⁶. Forests therefore play a major role in the atmospheric circulation and the water cycle⁴⁷ on land and may have a role in mitigating regional climate, desertification and water security problems.

Deforestation has a direct impact on wind and weather patterns globally and locally through modifications of the water cycle. However, in certain arid areas, forests can increase water deficits through higher evapo-transpiration than alternative vegetation types. This is particularly true for water-demanding fast-growing tree species and varieties planted on inappropriate sites⁴⁸.

Available information on forest influence on weather patterns is international rather than European. Investigations focussing on such influences in Europe would be desirable. Still, it will not be possible to apportion what part of changes results from climate change without long-term observation.

Question 1:

Do you think maintaining, balancing and enhancing forest functions should be given more attention? If so, on what level should action be taken, EU, national and/or other? How should it be done?

3. IMPACTS OF CLIMATE CHANGE ON FORESTS

Forests have developed together with the naturally changing climate over the millennia. As climate shifted slowly, and the natural environment presented few barriers, species and communities could adapt and evolve more easily⁴⁹. Most EU forest management is aimed at developing forests that are well adapted to local growing conditions. However the rapid rate of human-induced climate change is now overcoming the natural ability of ecosystems to adapt. The rate of temperature increase is unprecedented. A fragmented landscape, often simplified forest composition and structure and pressures such as forest dieback, new pests and storms make autonomous forest adaptation much more difficult. Therefore, increased human intervention regarding species choice and management techniques is likely to be required to maintain viable forest cover and continuity of all forest functions. Some regions may experience more favourable conditions for forest growth in the medium term.

⁴⁵ Menenti, M.; Verstraete, M; Peltoniemi, J. (2000): Observing land from space: science, customers, and technology. Kluwer Academic

⁴⁶ Makarieva, A. et al.: *Precipitation on land versus distance from the ocean: Evidence for a forest pump of atmospheric moisture*, in: Ecological Complexity, Volume 6, Issue 3, 09/2009

⁴⁷ Murdiyarsa, D.; Sheil, D.: *How Forests Attract Rain: An Examination of a New Hypothesis.*, in: BioScience 59, 2009

⁴⁸ <http://melbournecatchments.org>

⁴⁹ Also natural events such as the ice ages have sometimes caused more abrupt changes in the occurrence and distribution of species.

Mean temperatures in Europe have now risen by almost 1° C⁵⁰ during the past century and are expected to climb further, the most optimistic scenario forecasting an increase of 2° C by 2100. A change of this magnitude corresponds to the difference in the temperature optimum of forest types as different as spruce versus beech forest or beech versus oak stands. It will thus alter the suitability of whole regions for certain forest types, forcing a shift in natural species distribution and leading to changes in growth of existing stands. In addition extreme events (storms, forest fires, droughts and heatwaves) are expected to become much more common⁵¹ and/or severe.

Even without climate change, the capacity of forests to carry out their functions has always been under pressure from various natural hazards. While it is clear that in general climate change exacerbates such hazards, it is impossible to accurately quantify how much impact is due only to climate change compared to historical levels. For this reason, the impacts on forest functions from both endemic and climate change causes are considered as a whole.

3.1. Shifting environmental conditions and dieback

Overall, projections of the net effects of climate change on EU forest species' populations in the medium term are complex⁵²:

In the Northwest of Europe, where water supplies are, typically, less limiting, growth rates are likely to be enhanced by a combination of rising carbon dioxide levels in the atmosphere, a longer growing season and increased nutrient availability as a result of atmospheric deposition and increased soil mineralisation.

In Southern Europe, where water availability is a critical factor, more frequent summer droughts may lead to reduced productivity and resilience. Following droughts and heatwaves, forest decline has been observed over the last few decades in Mediterranean countries with dieback and death of several pine and oak species⁵³, generally attributed to dryer and warmer climatic conditions⁵⁴ and often combined with biotic factors (insect pests and diseases).

Longer term projections are more uncertain and depend on the winter resistance and summer resistance of affected forest types and species. As an example, the loss of Alpine habitat suitable to Arolla pine at lower elevations would be 2.4 times the gain due to a shift in upward altitudinal distribution.⁵⁵

Changing climate is also likely to⁵⁶:

- increase the levels of damage caused by domestic forest pathogens and pests;

⁵⁰ 4AR of IPCC, WG 1 www.ipcc.ch

⁵¹ <http://www.fao.org/docrep/011/i0670e/i0670e10.htm>

⁵² EEA rep. No 4/2008 / SEC(2009)387

⁵³ Colinas, C.; De Dios, V.; Fischer, Ch.: Vol. 33, No 1, 01/2007

⁵⁴ Gonzales, C (2008): Analysis of the oak decline in Spain "la seca". Thesis, SLU Uppsala

⁵⁵ Casalegno, S. et al., 2010 Forest Ecology and Management (in press)

⁵⁶ BOKU, EFI, IAFS, INRA (2008): Impacts of Climate Change on European forests and options for adaptation

- bring new exotic infestations, whether introduced by man or migrating naturally ;
- changes in population dynamics.

3.2. Destructive storms

Historical time series about storm damage in the EU are patchy and will require more research in the future to allow adequate risk analysis for the forest sector. During the past 10 years, however, large damaging storms have occurred in Europe more frequently. Storms have become the single most damaging factor in temperate Europe and storm losses now exceed 50 % of all types of forest-related damage⁵⁷. In January, 2005, a severe storm ("Gudrun") raged through Northern Europe, throwing over and damaging nearly an entire year's harvest (75 million m³) for the whole of Sweden. In 2007, the storm "Kyrill" caused extensive damage across NW lowland Europe. In January 2009 another major storm, "Klaus", levelled enormous areas of plantation forest in SW France and N Spain.

Besides the negative environmental impacts of such storms, there are social and economical consequences linked to mobilising such huge quantities of fallen timber much of it broken, split or up-rooted, reducing its saleability. To optimise salvage and the chances of sale, the timber must be logged as soon as possible, also in order to reduce the risk of further damage, e.g. from insect attacks, fungal decay and differential drying.

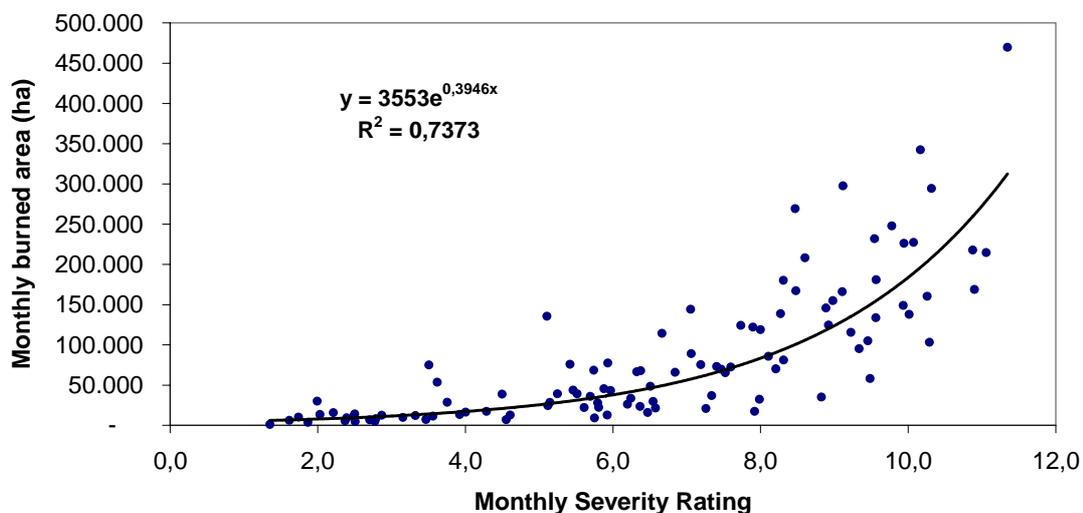
Whilst on a small scale, salvage operations may temporarily create local employment opportunities, large-scale storm damage usually requires redeploying personnel in planning, harvesting, transporting, marketing and storing large amounts of timber. This not only disrupts timber markets for certain grades of wood, but also forest operations which had been foreseen. Storm damage may also lead to expensive maintenance and repairs of traffic and ecological infrastructures.

3.3. Large fires

Climate change is forecast to cause, especially in Southern Europe, more droughts, higher temperatures and more windy periods. This will raise the likelihood and severity of fires, as indicated in the graph below, showing a strong correlation between mean burnt areas and the monthly fire danger severity rating (MSR)⁵⁸ of fire danger in exposed Member States⁵⁹. This means that future weather conditions in the EU Mediterranean region are likely to lead to an increase of the fire danger hence an increase of the burned areas.

⁵⁷ Lindner et al. 2008 http://ec.europa.eu/agriculture/analysis/external/euro_forests/full_report_en.pdf
⁵⁸ The Monthly Severity Rating explains fire danger on the basis of meteorological conditions
⁵⁹ Joint Research Centre-IES: European Forest Fire Information System, Forest fires in Europe 2008

Burned area vs Monthly Severity Rating in EUMed (June to October 1985-2005)



Currently, an average of 500,000 ha of forest is burnt in the EU annually with associated emissions of CO₂, other gases and particles⁶⁰. Over 50,000 forest fires are ignited each year in the most affected MS although this number has declined in the last decade, if compared to previous decades.

The higher fire risk and magnitude of forest fires have resulted in huge burnt areas in Portugal in 2003 (more than 400,000 ha) and 2005, and in Spain, in 1985, 1989 and 1994. In Greece in 2007, when temperatures reached 46°C, five major fires burnt 170,000 ha in the Peloponnesus region alone.

As well as causing human casualties, damaging property and reducing soil fertility through loss of organic matter, large fires hamper biodiversity conservation. During summer 2009, at least 30 % of the burnt area⁶¹ was in Natura 2000 sites in Bulgaria, France, Greece, Italy, Portugal, Spain and Sweden. Seriously affected forests in Natura 2000 sites face a major challenge to recover pre-fire condition particularly for biodiversity.

EU and MS efforts to address the issue of forest fire prevention have been significant and focussed on training, research, awareness-raising, and structural prevention. They will need to be stepped up as a consequence of climate change. A clear correlation also exists between active forest management and the reduction of fire risks: a well functioning bio-energy market, often obstructed by lack of proper management due to fragmented forest ownership, could have a significant fire prevention role by giving an economic incentive to remove biomass that currently feeds wildfires in abandoned forests.

⁶⁰ Westerling, A.L. et al: in: Science, Vol. 313. no. 5789 (08/2006)

⁶¹ EFFIS newsletter September 2009

3.4. Impacts on forest functions

The Council Conclusions on the recent Commission white paper "Adapting to climate change: Towards a European framework for action" emphasized the need of mainstreaming adaptation into all relevant policies by increasing the resilience of, i.a., forests. They further stressed the need to improve the assessment of the impacts of climate change in all relevant sectors and recognised the role of SFM in reducing the vulnerability of forests to climate change.

The Council conclusions also took note of the 2009 report⁶² of the International Union of Forest Research Organizations which stated: "Climate change over the past half-century has already affected forest ecosystems and will have increasing effects on them in the future. The carbon regulating services of forests are at risk of being lost entirely unless current carbon emissions are reduced substantially; this would result in the release of huge quantities of carbon to the atmosphere, exacerbating climate change".

The combined effects of climate change on forests, including shifting environmental conditions, dieback, storms and fires will be felt throughout Europe although at varying levels of intensity. They will have impacts on the socio-economic and environmental functions. The challenges now associated with particular regions are likely to spread beyond their traditional boundaries as is already evident for fires and storms. This growing EU wide dimension⁶³ raises questions to how best the EU can contribute to ensure forests can continue to deliver all their functions.

Question 2:

- To what extent are EU forests and the forest sector ready to address the nature and magnitude of the challenges posed by climate change?

- Do you consider particular regions, certain countries more exposed/vulnerable to the effects of climate change? What sources of information would you base your answer on?

- Would you see a need for EU-level early action to ensure all forest functions are maintained?

- How could the EU contribute to add value to the respective efforts of MS?

4. TOOLS AVAILABLE FOR FOREST PROTECTION

Today, MS have many tools at their disposal to ensure the protection of forests. MCPFE principles, MS and relevant EU legislation, forest information systems and SFM practices on the ground can all contribute. In addition, the Standing Forestry Committee, the Advisory Group on Forestry and Cork, the advisory Committee on

⁶² "Making forests fit for Climate Change, a global view of climate-change impacts on forests and people and options for adaptation", 2009.

⁶³ Winkel, G. et al (2009): http://ec.europa.eu/environment/forests/pdf/ifp_ecologic_report.pdf

FBI and the Expert Group on Forest Fires, chaired by the Commission, provide for regular exchanges of views between stakeholders, MS and the Commission.

4.1. National policies shaping forest use and forest management

All EU MS have national (and sometimes regional) legislation on forest management. This extends from specific forest legislation to forest related components of other legislation..

The usual instruments found across different EU countries or regions are:

- National Forest Programmes;
- Operational forestry standards;
- Inclusive and systematic National Forest Inventories (NFI);
- Land registry systems, an important tool for developing social and economic forest functions and restricting illegal conversion of forests;
- Mapping of forest functions and related planning at landscape and regional level;
- Forest management requirements, including management plans and sometimes including specific management obligations in relation to certain forest functions;
- Requirements on the production and use of propagation material;
- National action plans under the CBD or UNCCD;
- Support schemes to assist private forest owners and their associations;
- Legal provisions and incentives to reduce ownership fragmentation, sometimes coupled to incentives for co-operation among forest owners;
- Licensing regimes that make timber harvest contingent on approval by competent authorities;
- Restrictions on conversion of forest land to other uses.

In some instances, the above mentioned tools are mandatory, in others voluntary.

4.2. EU policies shaping forest use and forest management

In addition to the EU FS, the EU FAP and the Communication on Innovative and Sustainable Forest-based Industries⁶⁴ which are the only forest specific EU policy tools, a number of other EU policies are relevant though not specifically related to forests and forestry. Many key actions in the EU FAP refer to these policies, which are outlined below.

⁶⁴ COM(2008)113

- In the Natura 2000 network, forest habitats constitute almost 20 % of the designated terrestrial sites.
- EU climate policy recognises that to achieve its overall targets, all sectors, including land use, land-use change and forestry (LULUCF), must make a contribution⁶⁵. The Effort Sharing Decision⁶⁶ and the ETS directive⁶⁷ include provisions for the Commission to assess options for including LULUCF in the EU GHG reduction commitment.
- The Rural Development Regulation (2007-2013⁶⁸) is the main instrument for financing of forest measures and includes provisions for co-financing for afforestation, payments for Natura 2000 areas, prevention and restoration and other forest environmental measures as well as a wide range of investments in forest management and wood processing.

Measures related to the use of advisory services by forest holders contribute to promote the sustainable use of forests, increase awareness in climate change, encourage mitigation actions and assist forest holders in adaptation measures.

The cross-compliance mechanism can as well have an effect on forest management, especially after the Health Check modification that introduced water management in the Good Agricultural and Environmental Condition (GAEC) framework with the new standard “Establishment of buffer strips along water courses” that will be compulsory from 2012 at the latest. Wooded buffer strips may be created or preserved within the implementation of this policy.

- The Directive on the promotion of energy from renewable sources (RES-D)⁶⁹ sets a binding target for the EU to achieve a 20 % renewable energy share by 2020, in which the largest contribution is expected to come from biomass from agriculture, forestry and waste for heat and power generation as well as transport fuels.
- The Action Plan on Sustainable Consumption and Production and Sustainable Industrial Policy (SCP/SIP), aims at improving the energy and environmental performances of products. An EU Green public procurement policy for public bodies and the revised EU Eco-label⁷⁰ are part of this.
- The Community plant health regime (CPHR⁷¹) aims at preventing the spreading of alien forest species or of organisms harmful to forests. Its ongoing revision might introduce more flexibility regarding limitations on the use and trade of forest reproductive material and/or cope with the effects of climate change on pest and diseases as well as their vectors.

⁶⁵ COM(2007)2 / COM(2005)35

⁶⁶ Decision No 406/2009/EC

⁶⁷ Directive 2009/29/EC

⁶⁸ Council Regulation (EC) 1698/2005

⁶⁹ Directive 2009/28/EC

⁷⁰ http://ec.europa.eu/environment/ecolabel/index_en.htm

⁷¹ Council Directive 2000/29/EC

- Council Directive 1999/105/EC of 22 December 1999 on the marketing of forest reproductive material⁷² recognizes that the choice of forest reproductive material is important for forestry purposes and that this material should be genetically suited to the various site conditions and be of high quality.
- The 7th Research Framework Program (FP7) launched the concept of European Technology Platforms in areas where Europe's competitiveness, economic growth and welfare depend on important research and technological progress. The Forest Technology Platform brings together stakeholders, under industrial leadership, to define and implement a Strategic Research Agenda .
- FP7 also funds collaborative research on sustainable production and management of biological resources from forest and on the prediction of forthcoming ecological changes.
- The Commission's JRC work on remote sensing, climate change, forest monitoring, forest fragmentation, fires and forest information systems. COST projects have addressed Protected Forest Areas and NFIs.
- Current Cohesion Policy supports investments in renewable energy and co-finances programmes that preserve and promote natural areas and biodiversity.
- The EU Solidarity Fund ⁷³ assists MS in dealing with damage caused by major natural disasters including storms and forest fires.
- The EU Civil Protection Mechanism provides the framework for organising mutual assistance between the MS for responding to major disasters including forest fires and storms, which overwhelm the response capacities of the affected MS⁷⁴.
- The EU approach on natural and man-made disasters⁷⁵ recently endorsed by the Council⁷⁶ takes a multi hazard approach to risk assessment and management and identifies forest fires as an important priority for EU work on risk assessment and management.
- In order to ensure coherence, the inter-service group on forestry within the Commission meets regularly to discuss relevant forest related issues.

⁷² OJ L 011 , 15/01/2000,

⁷³ Council Regulation (EC) No 2012/2002

⁷⁴ Council Decision 2007/779/EC

⁷⁵ COM(2009) 82

⁷⁶ Council Conclusions of 30 November 2009
<http://www.consilium.europa.eu/uedocs/NewsWord/en/jha/111537.doc>

Question 3:

- Do you consider that EU and MS policies are sufficient to ensure that the EU contributes to forest protection, including preparing forests for climate change and conserving biodiversity in forests?

- In what areas, if any, do you think further action may be necessary? How might this be organized, under the given policy framework or beyond?

4.3. Forest management and use

Sustainable forest management, based on MCPFE principles, MS policies and requirements and supported by the EU particularly through rural development provides an important means at forest level for the transfer of policy to practice. Among the SFM practices supporting forest protection are:

- Afforestation, creating new forests to enhance carbon sequestration and enhance biodiversity on appropriate lands, to protect human settlements and cultural landscapes while also raising long term productive output;
- Fire prevention measures such as management of combustible material, establishment and maintenance of fire breaks, forest tracks, water supply points, appropriate choice of tree species, fixed forest fire monitoring facilities and communication equipments to prevent catastrophic fire spread.
- Proper forest planning that can support the adaptation of forest species composition by favouring more suitable tree species and breeds or, within a species, a higher genetic variability.
- Sustainable mobilisation and harvesting of wood as well as investments in forestry operations to increase stability and resilience of forests against climate change impacts, including reducing the risks of forest fires, pests and storms.
- Actively favouring tree species composition which is likely to be better adapted to site and growing conditions under changing climatic conditions including, inter alia, by the use of natural regeneration where appropriate and possible.
- Preserving endemic genetic resources and selecting those elements of the existing gene pool that are best adapted to expected growing conditions in the future. This may also involve the use of new varieties and species.
- Preventing the introduction by international trade of new pests and diseases, as well as their vectors (*e.g.* pinewood nematode in Portugal).

Question 4:

- **How could the practical implementation of SFM be updated in order to upkeep the productive and protective functions of forests and overall viability of forestry, as well as enhance the resilience of EU forests in view of climate change and biodiversity loss? ?**
- **What steps are required to ensure that the gene pool in forest reproductive material can be successfully conserved in its diversity and adapted to climate change?**

4.4. Forest Information

Information about forest resources and condition is essential to ensure that decisions made regarding forests bring greatest benefits in socio-economic and ecological terms on all levels. Moreover, the EU has reporting obligations towards the UNFCCC and the CBD that require reliable and consistent forest information systems. Currently, information concerning forests is held at several different levels:

- *Forest inventories:* National forest inventories (NFIs) hold most of the required information on forest resources. This information is not harmonised and is therefore of limited use at EU level. Through various projects, the Commission has been investigating the possibility:
 - to expand the scope of forest inventory systems beyond wood production aspects so as to include the improved SFM indicators and criteria endorsed by the MCPFE⁷⁷, as well as socio-economic information.
 - to harmonize NFI⁷⁸ in order to make them comparable.
- The integrated administration and control system (IACS, co-funded by the EU rural development fund) is used to manage and control not only direct payments, but also certain area-based measures of the rural development policy (e.g. agri-environment forestry measures).
- *Forest condition monitoring:* Under EU legislation, from 1987 to 2006, when the Forest Focus⁷⁹ regulation expired, MS have monitored forest condition according to the "scheme of large scale and intensive monitoring"⁸⁰. Since 2007 there is no EU legal basis for monitoring but the "FutMon" project under Life+⁸¹ is being supported with a view to develop future monitoring concepts.
- *Monitoring of forest fires:* The European Forest Fire Information System (EFFIS) is a voluntary approach, recognized by the MS, the Commission and the European Parliament as an essential tool for forest fire monitoring in Europe.

⁷⁷ http://www.mcpfe.org/system/files/u1/List_of_improved_indicators.pdf
⁷⁸ COST E43 report. <http://www.metla.fi/eu/cost/e43/>
⁷⁹ Regulation (EC) 2152/2003
⁸⁰ <http://www.icp-forests.org/>
⁸¹ Regulation (EC) No 614/2007

- *Forest classification*: The EEA has developed a forest typology⁸² which could eventually be used for European-level forest assessments on an ecological basis but so far only few MS have tested it in their forest information systems. Its adoption will still require considerable technical work and resources.

The European Forest Data Centre (EFDAC) developed by the Commission, capitalizes on existing forest information and monitoring databases in the EU, integrates the European Forest Information and Communication Platform (EFICP)⁸³, and builds on several initiatives of the Commission⁸⁴. EFDAC aims at becoming the focal point for forest information in Europe. It currently includes all the spatially detailed data collected under past EU regulations and the results of past projects.

Eurostat provides yearly statistics on the production of and trade in wood and wood products for the EU and EFTA countries. It works in conjunction with UNECE, FAO and ITTO (International Tropical Timber Organisation) as part of a worldwide exercise, using a single joint questionnaire based on a set of harmonised definitions. These data could contribute to modelling the carbon contained in yearly wood removals from the forest and stored in wood products. Eurostat also provides yearly economic indicators for forestry, logging and FBI.

Aggregated data on forest damage, except in the case of fires, do not provide any measure of the actual level of damage. A system to monitor pest outbreaks in the EU does not currently exist but might be needed considering the expected impacts of climate change on distribution of harmful organisms. Furthermore, lack of comparable and verifiable information has led to an incomplete picture about GHG balances in forestry operations and their impact on forest biodiversity.

The need for more harmonized, reliable and comprehensive information on forests is increasingly recognized by the Commission, the MS and many economic operators. The recent mid-term review⁸⁵ of the EU FAP called for an enhancement of the existing forest information systems. While some MS may have forest information satisfying their own needs, it may not add up to information that is helpful at EU or global levels.

Harmonised reporting on a more complete set of indicators could be an effective way towards better information about forest use, forest functions and ultimately forest protection. Better information on forest carbon and sequestration of carbon in harvested wood products is also essential to support forests and forestry to further effectively contribute to climate change mitigation. The considerable difficulties that recently arose in the formulation of EU submissions to international processes, such as the Copenhagen climate conference have made this quite clear.

⁸² http://www.eea.europa.eu/publications/technical_report_2006_9

⁸³ EFICP <http://eficp.jrc.ec.europa.eu/EFICP/>

⁸⁴ INSPIRE, SEIS and GMES

⁸⁵ http://ec.europa.eu/agriculture/eval/reports/euforest/index_en.htm

Question 5:

Taking into account the various relevant policy levels, is available forest information today sufficient to assess with sufficient accuracy and consistency:

- **The health and condition of EU forests?**
- **Their productive potential?**
- **Their carbon balance?**
- **Their protective functions (soils, water, weather regulation, biodiversity)?**
- **The provision of services to society and their social function?**
- **Overall viability of forestry?**

If it is insufficient, how should forest information be improved?

Are efforts towards harmonised⁸⁶ data collection on forests sufficient?

What can the EU do to further develop and / or enhance forest information systems?

5. NEXT STEPS

Many forests throughout Europe will increasingly be challenged by climate change. Preparing to meet these challenges now is the best way to ensure that forests can continue to deliver all their functions. The purpose of this Green Paper is to encourage an EU-wide public debate and to secure views on the future of forest protection and information policy, as well as to provide elements for a possible update of the EU Forestry Strategy on climate related aspects.

The European Institutions and all those interested – organisations or private individuals – are invited to submit their comments on the questions set out in the Green Paper as well as on any other issues concerning forest protection and information that they wish to raise. The consultation process will be articulated as follows:

A web-based public consultation will be open until 31 July 2010.

The Commission will organise a workshop and a stakeholders meeting on this Green Paper in Brussels in June 2010.

The Commission will publish the stakeholders' contributions on Internet and will provide its own feedback of the main outcomes of the consultation.

The results of the public consultation will help shape the further work of the Commission regarding the contribution the EU can make to forest protection under a changing climate, including the information required to achieve this.

⁸⁶ In this context, "harmonized" has to be understood in the sense of making the information systems output comparable and compatible, and not rendering uniform field procedures.

MS and concerned stakeholders are kindly requested to submit their replies to the Green Paper by 31 July 2010 at the latest. The replies should be sent to the following address:

By mail:

European Commission

Directorate General for Environment

Unit B1: Forest, Soil and Agriculture

BU-9 04/029 B-1049 Brussels, Belgium

By e-mail:

ENV-U43-sector-forest@ec.europa.eu

It is important to read the specific privacy statement attached to this consultation for information on how your personal data and contribution will be dealt with. Professional organisations are invited to register in the Commission register for Interest Representatives (<http://ec.europa.eu/transparency/regrin>). This register was set up in the framework of the European Transparency Initiative with a view to provide the Commission and the public at large with information about the objectives, funding and structures of interest representatives.