14. Forest

policy issue	indicator	assessment
influence of land-use policy	total forest area and 'naturalness'	
sustainability of wood production	annual fellings and increment of growing stock	
reducing impacts of forestry	origin and impacts of tree planting material	
reducing pollution stress, and other impacts, on forest ecosystems	forest condition	
conserving biodiversity	threatened forest species and protection of forest habitats	
- " -	level of protection of forests	

The area of forests in EU and Accession Countries is increasing and annual fellings are considerably lower than what is required for sustainable wood production. However, while not a major contributor to total tree planting in Europe, non-native species are extensively used in some countries and their environmental effects need to be better evaluated.

The condition of European forests deteriorated continuously between 1986 and 1995, as shown by the defoliation of trees in the large UNECE ICP Forest monitoring programme. Conditions subsequently stabilised at a high level of damage, with almost a quarter of sample trees damaged.

Europe's forest biodiversity is under pressure, with a significant proportion of the protected species and habitats under European Directives being forest-related. These Directives also prescribe clear responsibilities for conserving threatened species, as well as 59 specific forest habitat types, providing the framework for the progressive protection of forests.

Most of the European land area is potentially forest. Since prehistoric times, European forests have been cleared for agriculture, including grazing by livestock, resulting in large areas with no or only fragmented forests. The industrial exploitation of forests in the late 1800s for timber (and later pulp) created, in many European countries, a general concern about the sustainability of the wood resource, which resulted in a number of National Forest Laws during the 1900s. More recently these Forest Laws are being developed into a framework of general resource management, also including biodiversity.

The fragmentation of forests by agricultural clearing has been exacerbated by land take for urban development and infrastructure (see chapter 13), as well as by large-scale and repeated fires in Mediterranean regions. In addition, human activity has utilised most of the remaining forest. In the late 1990s, this trend was partly reversed by afforestation and spontaneous regrowth on former agricultural land.

Long-range atmospheric pollution (see chapter 10) was recognised as a new major threat to European forests in the 1980s and 1990s, as large-scale crown damage and even total die-off of stands was noted. Climate change will cause long-term effects on forest ecosystems, but may also result in short-term effects, such as those resulting from the creation of carbon sinks as mitigation measures (see chapter 9).

Forests are a key repository of biological diversity and the species, communities and ecosystems they form play a central role in the functioning of the biosphere. On the political arena, a global concern

for the loss of biodiversity was introduced at the UN Conference on Environment and Development in Rio 1992. Forestry and biodiversity issues were among the priorities, resulting inter alia in the Convention on Biological Diversity, the Forest Principles and a forest component of Agenda 21. In Europe, activities to implement these commitments have resulted, for example, in the 'Environment for Europe' process endorsed by the Environment Ministers and the Ministerial Conferences for Protection of Forests in Europe (MCPFE) set up by the Forest Ministers.

MCPFE has developed a set of *Pan-European Criteria, Indicators and Operational Level Guidelines for Sustainable Forest Management*, which also are implemented in current certification schemes. The EU has implemented these concerns in, for example, the Habitats Directive (92/43/EEC), the Community Forestry Strategy and Community Biodiversity Strategy and, most recently, the Biodiversity Action Plans. If all the existing instruments are adequately implemented, the biodiversity of European forests has a potential to recover.

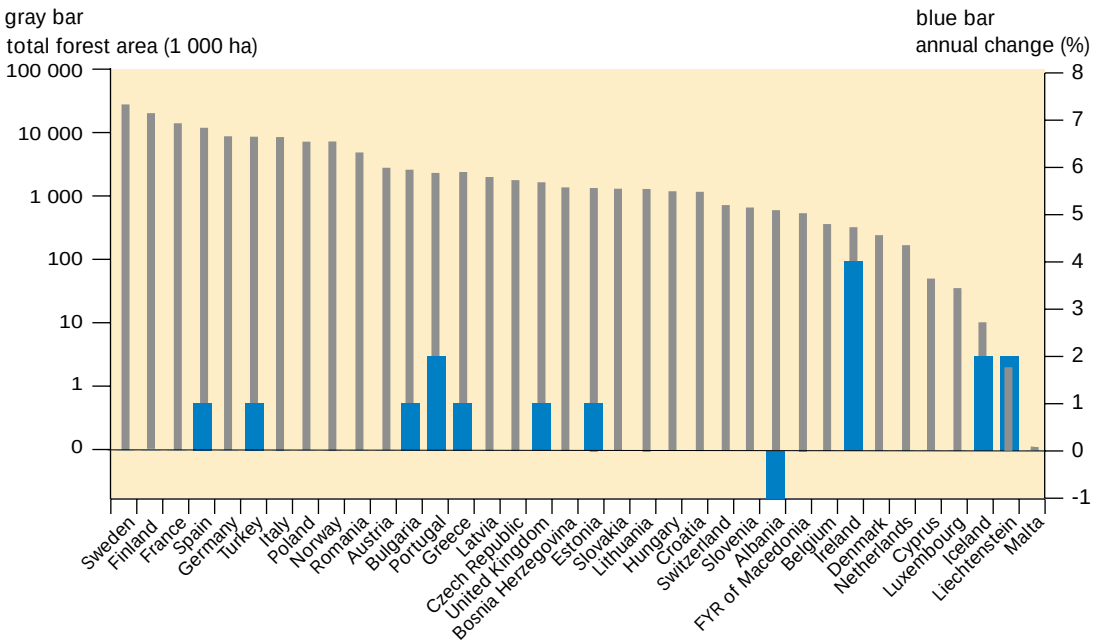
Pan-European Forest Certification (PEFC)

The Pan European Forest Certification (PEFC) Council was launched in June 1999. The PEFC scheme, a voluntary private-sector initiative, aims to provide assurance to the customers of woodland owners that the products they buy come from independently certified forests managed according to the Pan European Criteria as defined by the resolutions of the Helsinki and Lisbon Ministerial Conferences of 1993 and 1998 on the Protection of Forests in Europe. The following European countries are currently members of the PEFC council: Austria, Belgium, Czech Republic, Denmark, France, Finland, Germany, Ireland, Italy, Latvia, Norway, Portugal, Spain, Sweden, Switzerland and the UK.

The purpose of the PEFC scheme is to promote an internationally-credible framework for forest certification schemes and initiatives in European countries, in the first instance, which will facilitate mutual recognition of such schemes. The PEFC Technical Document and Statutes define the basic requirements of forest certification and the set-up of institutional arrangements at Pan-European and national and sub-national levels. Timber from certified forests that meet the PEFC criteria and requirements have access to the PEFC logo.

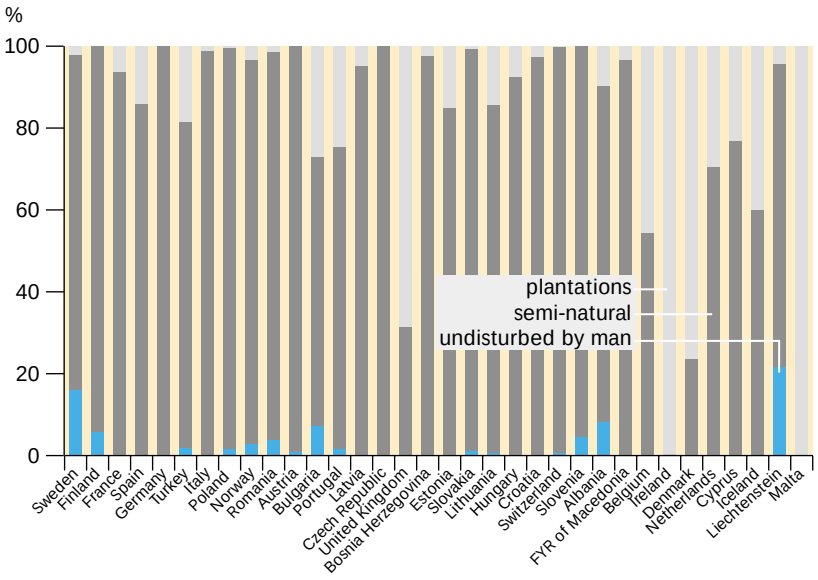
Source: www.pefc.org

Annual change in total forest area Figure 14.1



Notes: Calculation of annual change is based upon two reference periods; most countries compared data for a period of 1-5 years in mid-late 1990s with an earlier reference period that was generally 5-10 years before.
Source: TBFRA, 2000

Figure 14.2. **Forest land in categories of 'naturalness'**



Notes: Categories defined by TBFRA (2000), but country differences in interpretation exist. No data available for Greece and Luxembourg. Country order according to total forest area.
Source: TBFRA, 2000

The area of forest in EU and Accession Countries is increasing, however, the benefits of afforestation must be evaluated against resulting gains and losses in biodiversity.

Quality of information ☆☆

http://www.unece.org/unece/trade/timber/fra/pdf/contents.htm

14.1. Total forest area and 'naturalness'

The average annual increase in forest area in the EU and Accession Countries amounted to approximately 0.5 million ha/year (18 % as aggregate annual change), with the Mediterranean countries, in particular Spain, France, Portugal, Turkey, Greece and Italy, reporting the largest increase in absolute area (6.8 % as aggregate annual change). In these countries a large-scale conversion of other wooded or agricultural land to forest is taking place, either actively by afforestation/planting programmes or by decreasing grazing pressure and thus allowing regrowth through natural succession. The countries with the largest relative increase in forest area (between 2 and 4 %) are Portugal, Iceland and Ireland. Only Albania and Belgium reported a slight decrease in forest area (8000 and 1000 ha/year respectively, -0.6 and -0.2 % in relative terms).

However, increased afforestation is not always positive for biodiversity, depending on the structure and composition of the newly created forests as well the management regime envisaged. Furthermore, in Mediterranean countries, as well as in mountainous areas, afforestation often results in a reduction of biodiversity-rich grasslands. The effects of this need to be balanced against the potential long-term gains of biodiversity related to the newly created forests.

Most of the forest area (90 %) is classified as 'semi-natural', with the remaining 6 % classified as plantations. Countries with considerable proportions of plantations of their total forest area are Ireland, Denmark, the UK and Malta. The proportion of forest undisturbed by man in the majority of countries averages between zero and 1 %, with most of the undisturbed forests being located in Sweden and Finland (5.5 million ha). Other countries reporting important remnants of undisturbed forests include Bulgaria, Norway, Romania and Turkey. Outside the Nordic countries, these remnants tend to be small, but are highly valuable for their ecological richness.

14.2. Annual fellings and increment of growing stock

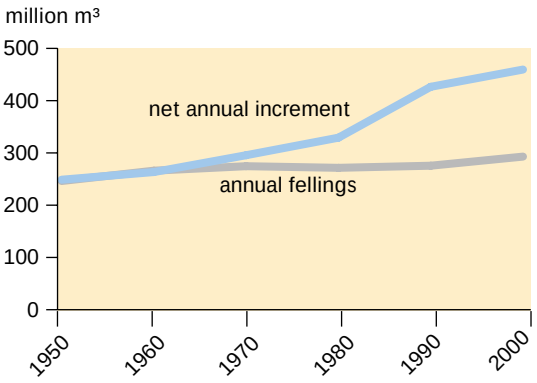
The ratio of annual fellings to annual increment of the growing stock of forests has for decades been used as a measure of the sustainability of forestry with respect to the overall wood resource. Nearly 90 % of the annual increment is potentially available for wood supply in the EU and accession countries. In some countries the share of the increment reaches 99-100 % (e.g. Belgium, Denmark, France, Ireland, Luxembourg and the UK). These figures reflect a low percentage of forests exempt from forest management, as well as the long history of silvicultural traditions in Europe.

With the exception of Cyprus, actual fellings remained below the sustainability level set by the increment of growing stock. For the EU and Accession Countries overall, average annual fellings are only 60% of the net annual increment of the growing stock for forest available for wood supply.

For the EU, long time-series data show only a slight increase for annual fellings, while the annual increment increased steadily after the 1960s. There are several reasons that may contribute to this:

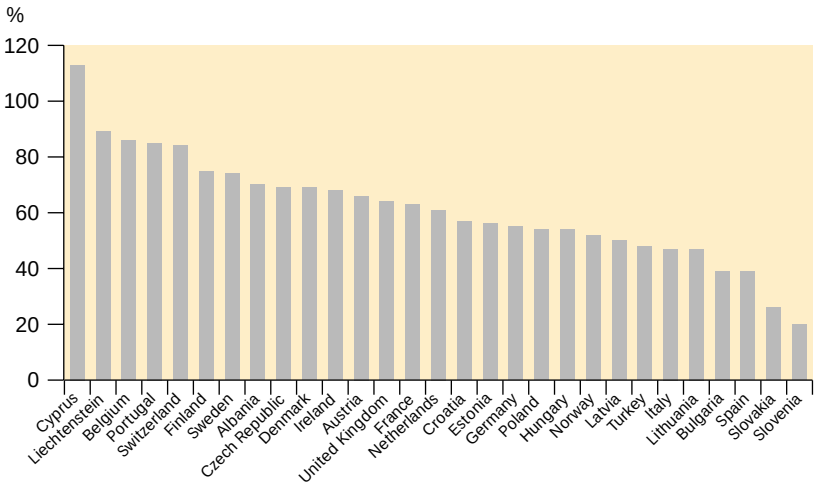
- forest management modifying the forest structure by altering the density of the stands, the distribution of age classes, the tree species composition, active regeneration measures and shortening of rotation periods;
- intensification measures like drainage of peatlands and wet forest or fertilisation;
- environmental changes, in particular the deposition of nitrogen;
- methodological aspects behind the presented data, such as changed definitions applied to increment, forest area or growing stock. More accurate measurement methods over time can also be responsible for altering the increment figures.

Net annual increment and annual fellings, EU — Figure 14.3.



Notes: No data available for annual fellings in 2000 for Greece and Luxembourg
Source: Kuusela, 1994; TBFRA, 2000

Annual fellings as percentage of annual increment of growing stock — Figure 14.4.



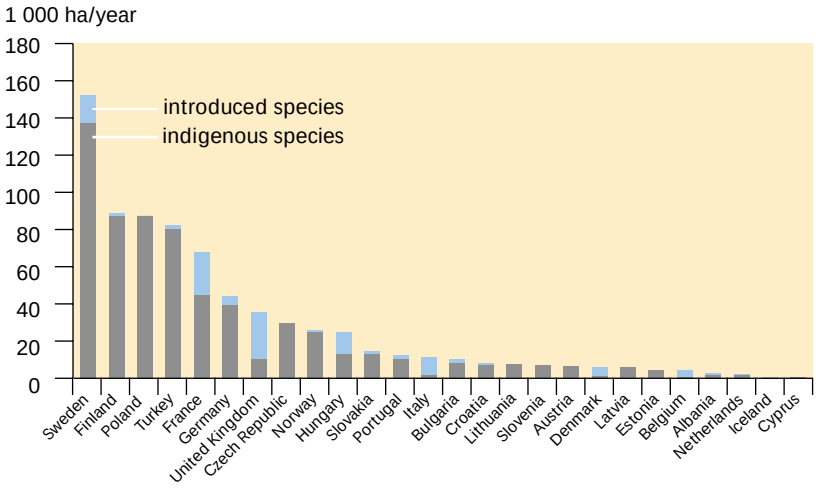
Notes: Year of data assessment varies between countries (1986-1996). No data available for Bosnia-Herzegovina, Greece, Luxembourg, Malta, Romania and the FYROM. Annual fellings do not include annual fellings of natural losses where countries have reported this figure.
Source: TBFRA, 2000

Overall, the sustainability of wood production in the EU and Accession Countries is indicated by the fact that annual fellings represent only approximately 60 % of the net annual increment of the growing stock for forest available for wood supply. Reasons for the steady increase in net annual increment since the 1960s include improved management and draining, and nitrogen deposition.

Quality of information ☆☆

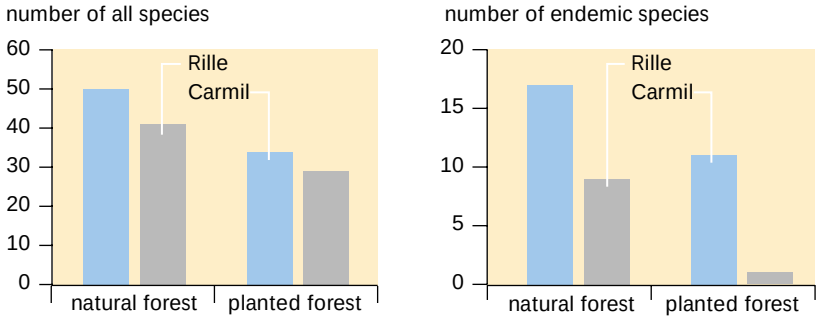
http://www.unece.org/unece/trade/timber/fra/pdf/contents.htm
http://www.efi.fi/efidas/

Figure 14.5. **Origin of tree planting material**



Note: Other countries that are also known to use introduced tree species, such as Ireland, Spain and Malta, are not included in the data set.
Source: TBFRA, 2000

Figure 14.6. **Richness of insects in forest soils**



Notes: This case study illustrates the effects of introducing new tree species on Collembolan species richness in soils of native beech forest versus conifer plantations in Ariège Pyrenees. The group of Collembola insects is a very important component of soil biodiversity. They play a major role in the breakdown of litter, soil constitution and structure. Comparison between forest stands in two different sites surveyed, Carmil and Rille in the French Pyrenees, show the same trends.
Source: Deharveng, 1996

With noticeable exceptions, forests in the EU Accession Countries are planted mainly with indigenous species. The effects on biodiversity of introducing non-native tree species need to be better evaluated.

Quality of information ☆☆

http://www.unece.org/unece/trade/timber/fra/pdf/contents.htm

14.3. Origin and impacts of tree planting material

The vast majority of forest planting in the EU and Accession Countries uses indigenous tree species. However, in some counties the use of introduced species is more common (e.g. Belgium, Denmark and the UK). France, Germany, Hungary and Sweden use planting material of both native and introduced origin.

Introduced, non-native, species commonly used for plantations in Europe include conifers like *Picea sitchensis* and *Pinus contorta* and deciduous trees such as *Eucalyptu* and *Populus* species. Only a few of the introduced tree species used so far in Europe have been shown to be invasive and/or harm the original biodiversity. A study in the Pyrenees of the effects of introduced species on soil biodiversity, for example, showed a decrease in species diversity of the soil Collembola in the planted pine stands compared to native beech forest. The effect on endemic species was particularly dramatic.

Several studies have been performed on bird communities. In Portugal, Eucalyptus plantations have been shown to have impoverished bird communities compared to those in native stands, while the changes were shown to be more complex in *Pice sitchensis* plantations in Ireland (Dias et al., 2000; O'Halloran et al., 1998; Rego, 2001). In northern Sweden, introduced *Pinus contorta* was compared to native Scots pine, using the Pied Flycatcher as an indicator. No change in population sizes was recorded, but other population parameters related to reproductive success were significantly lower in the plantations with introduced pine (Sjoberg et al., 1993).

From these case studies, it appears that to avoid unwanted changes in biodiversity, every introduction of non-native forest tree species needs to be carefully assessed with respect to biodiversity effects and evaluated taking into account potential risks. Long-term research and monitoring is needed to better understand the effects of non-native species.

14.4. Forest condition

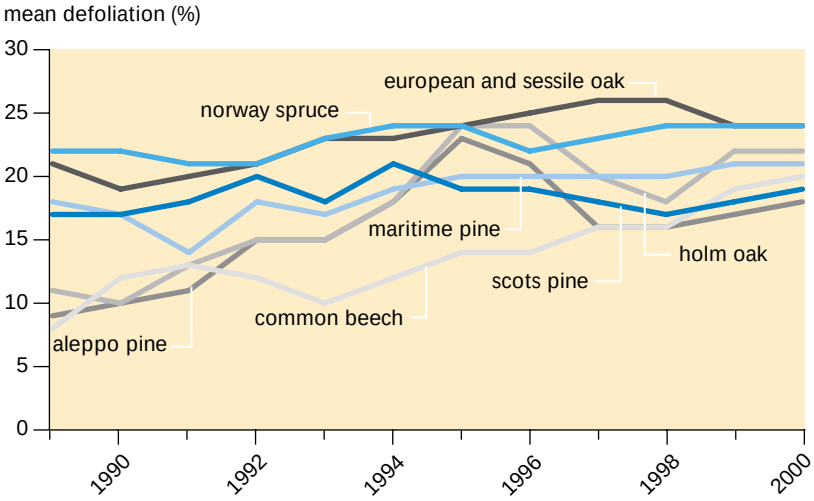
For 15 years, the conditions of European forests have been under close observation by one of the world's largest biomonitoring systems run by ICP Forests - the International Co-operation Programme on Assessment and Monitoring of Air Pollution Effects on Forests operating under the United Nations Economic Commission for Europe (UNECE).

European forests showed a continuous deterioration in condition between 1986 to 1995, as indicated by crown condition. Results since 1995 show a stabilisation at a high level of damage, with almost a quarter of the sample trees rated as damaged in 2001. Improving trends during recent years were identified in the Mountainous North, Temperate Boreal and Subatlantic regions. The sharp increase in the observed damage in the Continental region may be explained mainly by weather extremes. Local experts have linked the alarming increase in the Atlantic South region to, for example, forest fires.

An earlier recorded improvement in defoliation of the Scots pine starting in 1994 has reversed since 1998. This is mainly due to a slight worsening of the conditions in the Continental, Mountainous South and Atlantic North Climatic regions. Mean defoliation of Norway spruce, as well as of European and sessile oaks, has fluctuated at a high level of damage during the past decade. An alarming increase in the number of trees in defoliation classes 2 to 4 (defoliation >25 %) occurred in the Atlantic South region, mostly Spain. This applies to all the common tree species recorded. Local experts link this defoliation with forest fires and fellings, partly in connection with construction measures.

The most important causes of damage include weather extremes, insects and fungi, and air pollution. Nitrogen deposition (median of 14 kg per year per hectare at 309 plots) is now greater than sulphur deposition (9 kg per year per hectare), with higher deposition in western than in northern or southern European forest ecosystems. Both substances cause changes in the acidity of soils and thus influence the uptake of minerals by trees. Acid deposition can cause direct damage to leaves and needles. High nitrogen deposition in European forests results in trees becoming more susceptible to extreme weather conditions and insect attacks. Current ozone concentrations (see section 10.6), notably in southern Europe, have been shown to reduce tree growth, cause visible leaf injury and affect semi-natural vegetation.

Development of mean defoliation for European main tree species — Figure 14.7.



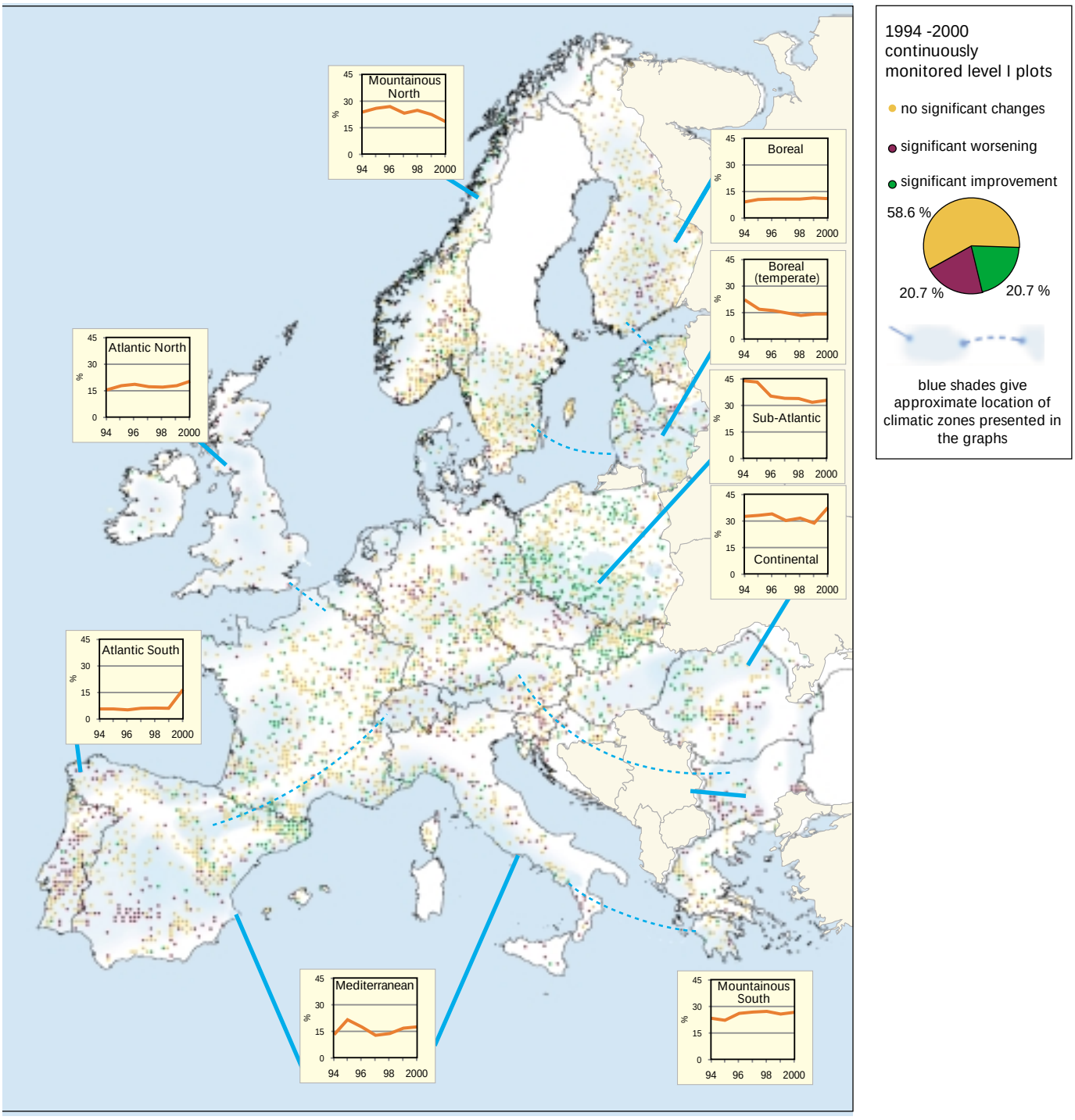
Source: UNECE and European Commission, 2001

☹ **European forests showed a continuous deterioration in condition between 1986 and 1995, using crown condition as an indicator. Results since 1995 show a stabilisation at a high level of damage, with almost a quarter of the sample trees rated as damaged.**

Quality of information ☆☆☆

www.icp-forests.org

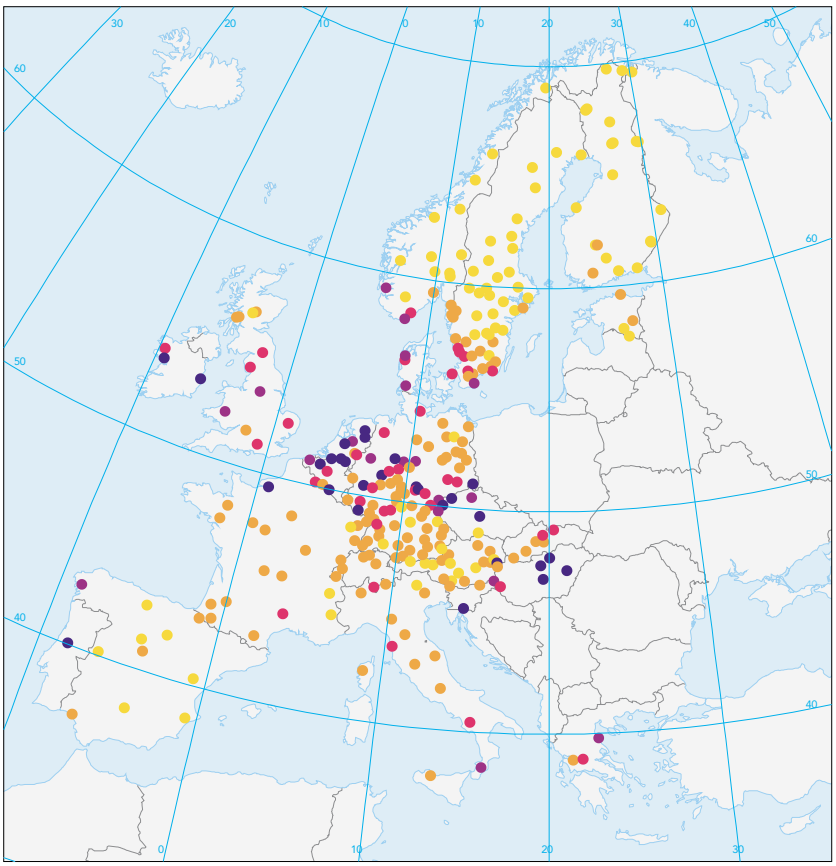
Map 14.1. **Changes in defoliation of main tree species, 1994-2000**



Source: UNECE and European Commission, 2001

Average total deposition of sulphate, 1995-1998

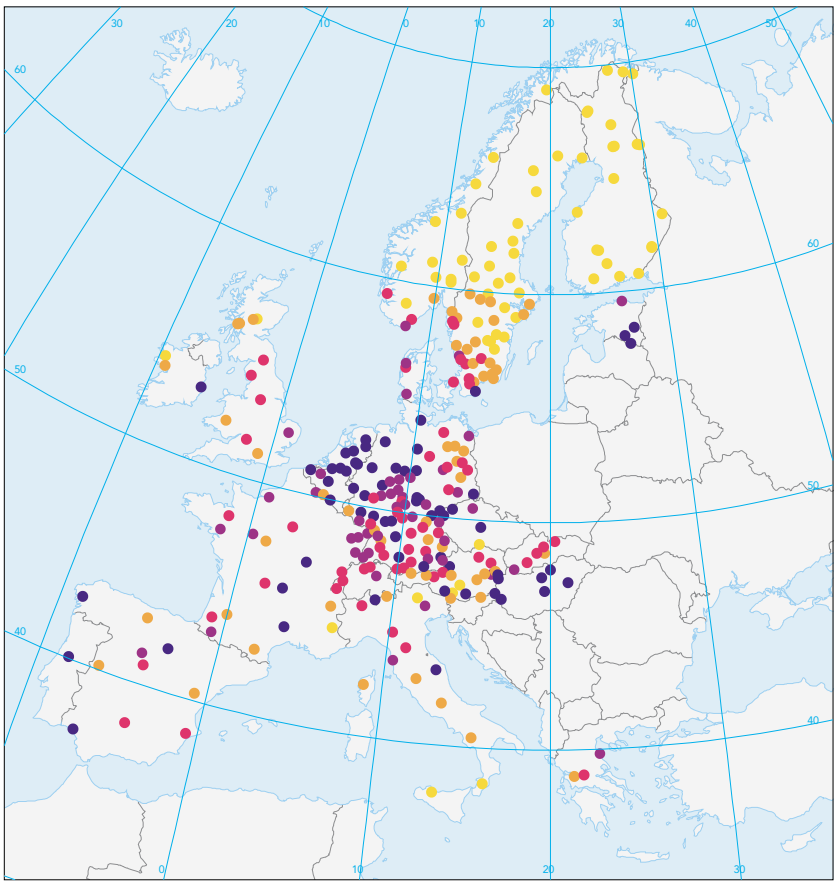
Map 14.2.



Notes: At 309 intensive monitoring plots.
Source: UNECE and European Commission, 2001

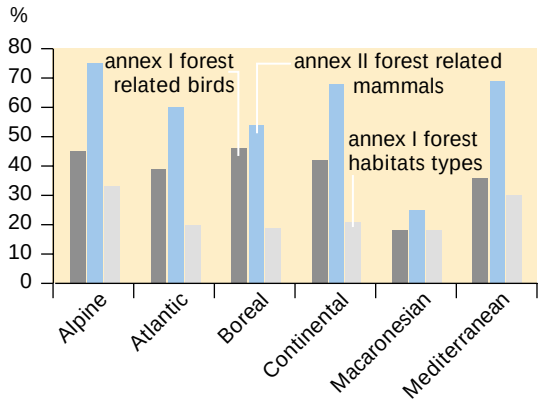
Average total deposition of nitrogen, 1995-1998

Map 14.3.



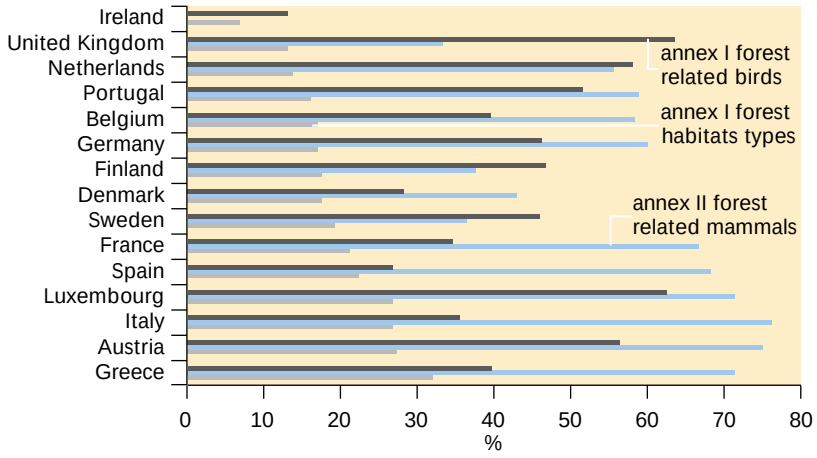
Notes: At 309 intensive monitoring plots.
Source: UNECE and European Commission, 2001

Figure 14.8. **Proportion of forest-related species and habitats of European concern in relation to all species and habitats of EC Directives per biogeographic region**



Note: For details of biogeographical regions see http://www.europa.eu.int/comm/environment/nature/map.htm. The proportion of forest-related species and habitats of European concern varies according to the biogeographical context. Annex II mammals related to forests are dominant in most biogeographic regions (except Macaronesia), while the situation for birds and habitats is more varied. It is interesting to note that, in proportion, the number of Annex I forest-related habitats in the Boreal region is quite low, which means that there is a significant number of other habitats of European concern are present in this region, for instance coastal habitats and wetlands. In contrast, up to 30 % of habitats of European concern present in the Alpine and the Mediterranean regions are forest-habitat types. Responsibility for the conservation of these species and habitats is shared differently within EU countries, Portugal and Spain having, for instance, a special responsibility for priority forest-related bird species.
Source: EEA

Figure 14.9. **Proportion of forest-related species and habitats of European concern in relation to all species and habitats of EC Directives per EU Member State**



Source: EEA

While forest biodiversity is still under threat, EU Directives prescribe clear responsibilities for conservation of forest species and habitats.

Quality of information ☆☆☆

http://europa.eu.int/comm/environment/nature

14.5. Threatened forest species and protection of forest habitats and species

Europe's forests, which are under threat from a variety of sources, are an important biodiversity resource. At the pan-European level, 40 % of threatened bryophytes (mosses, liverworts and hornworts) and 30 % of breeding bird species that are considered to have an unfavourable status are forest-related. Large carnivores, whose populations have been declining in several European countries over recent decades (e.g. bear, lynx, wolf, wolverine), are very dependant on forests. Invertebrates, including insects associated with dead wood and soils, are a major component of forests biodiversity and biomass, however, it is more difficult to assess their decline.

Specific actions have been taken for species and habitats of special European concern. This is being done through the Bern Convention at the Pan-European level and EU legislation. Under the Bird Directive, EU countries that host bird species listed in Annex I of this Directive have to designate Special Protection Areas (SPAs) in order to ensure their 'favourable conservation status'. Under the Habitats Directive they have to designate Special Areas of Conservation (SACs) for habitats listed in Annex I and species listed in Annex II. SPAs and SACs will constitute the NATURA 2000 network. Forests are important for protected species and habitats, for example:

- out of 181 bird species listed in Annex I of the Bird Directive, 65 are forest-related (36 %), of which seven are considered a priority;
- out of 41 mammal species listed in Annex II of the Habitat Directive, 25 are forest-related, of which eight are considered a priority;
- out of 198 habitat-types listed in Annex I of the Habitat-Directive, 59 are forest-types (30 %), of which 21 are considered a priority.

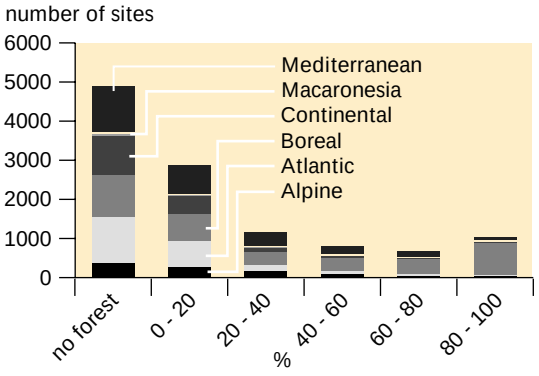
14.6. Level of protection of forests

Protection of forests is part of a growing number of regulations, initiatives and programmes, at the national, European and international level. At the pan-European level, protection of forests for biodiversity purposes is a key aspect of the Pan-European Process on the Protection of Forests in Europe. At the EU level, the Habitats Directive (92/43/EEC) takes into account conservation of forest biodiversity. To date, the number of sites proposed for one or more of the 59 specific forest habitat types listed in Annex I of the Habitat Directive is around 7 800, of which around 5 300 include priority forest habitat types. The importance of forest cover in sites proposed under the Habitat Directive varies depending on the biogeographic context. For example, forests are a very important component of proposed sites in the Boreal region, however they are less important in the Alpine and the Mediterranean regions.

In the Macaronesian region, the low percentage of forest area in the sites proposed is due partly to the importance of the marine area, which represents 35 % of the total surface area. In this region, forests include endemic types such as the Canary Island pine forest and the Macaronesian laurel woodland, both extremely rich in floral and faunal species, many of which are endemic in this part of the world.

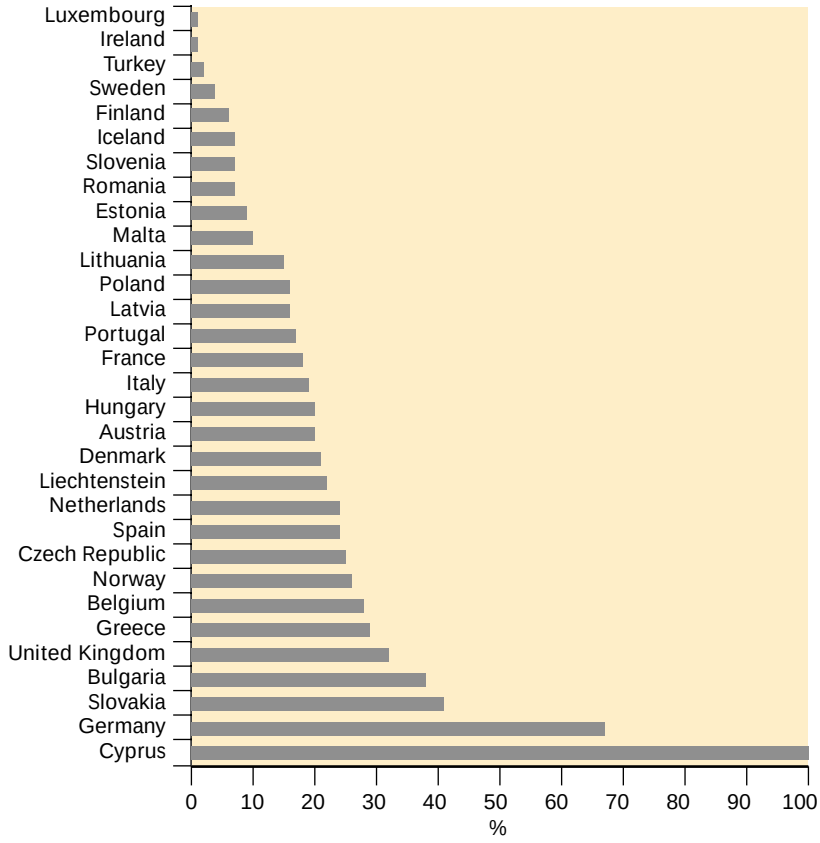
Many sites to be designated as part of the NATURA 2000 network already have a protection status at the national level, with specific national designations types such as 'national parks', 'nature reserves' and 'strict forest reserves'. A joint programme between EEA, Council of Europe and UNEP-WCMC is currently producing an inventory of these designations types. For protected forests, a preliminary assessment is given in TBFRA, 2000.

Forest cover in sites proposed under the Habitats Directive within biogeographical regions — Figure 14.10.



Note: For details of biogeographical regions see http://europa.eu.int/comm/environment/nature/map.htm.
Source: EEA

Forest area protected in Europe — Figure 14.11.



Source: TBFRA, 2000

Progressive protection of forests is taking shape.

Quality of information ☆☆

http://www.europa.eu.int/comm/environment/nature/natura.htm