BACKGROUND INFORMATION

FOR IMPROVED PAN-EUROPEAN INDICATORS

FOR SUSTAINABLE FOREST MANAGEMENT

3 February 2003

INTRODUCTION

Since the first set of Pan-European Indicators for Sustainable Forest Management (SFM) had been developed in the early 90s, experience has shown that criteria and indicators are a very important tool for European forest policy. In the meantime knowledge and data collection systems as well as information needs have gradually developed further. Thus, initiated through the Lisbon Conference in 1998, the Ministerial Conference on the Protection of Forests in Europe (MCPFE) decided to improve the existing set of Pan-European Indicators for SFM. This work aimed to consider the variety of experiences of European countries with the instrument of criteria and indicators for SFM. In addition rural development aspects were part of the discussion and ultimately incorporated in several indicators. Furthermore, topics such as climate change, biodiversity and socio-economic aspects influenced the discussion and the results of the improvement process. Finally, also work done in other processes on criteria and indicators for SFM was taken into consideration in the improvement process of the Pan-European Indicators for SFM.

The following procedure was chosen for the improvement process:

Before the improvement various evaluations of the usefulness, strength, weaknesses and feasibility of the Pan–European Indicators for SFM were conducted in 1994/1995, 1999 and 2000. The results of these evaluations were used as a basis for the improvement of the pan-European indicators for SFM.

To ensure that best use is made of the existing knowledge on indicators and data collection aspects in Europe, an Advisory Group (AG), representing relevant organisations in Europe, was formed to assist the MCPFE. Its members were Mr. Michael Köhl (IUFRO/UNECE Team of Specialists TBFRA 2000), Mr. Thomas Haußmann (ICP Forests), Mr. Tor-Björn Larsson (European Environment Agency), Mr. Risto Päivinen (European Forest Institute), Mr. Derek Peare (IWGFS/Eurostat) and Mr. Christopher Prins (UNECE/FAO).

The Advisory Group consulted with a wide range of experts through a series of four workshops. These workshops ensured that the diversity of national situations and experiences as well as the work undertaken by various bodies in Europe were adequately reflected. The first MCPFE Workshop on the Improvement of Pan-European Indicators for SFM was held in March 2001 in Triesenberg, Liechtenstein. The second workshop took place in September 2001 in Copenhagen, Denmark, the third one in January 2002 in Budapest, Hungary. The fourth and final workshop was convened in May 2002 in Camigliatello Silano, Italy.

The indicators under all criteria, as presented in this document, are results of these four workshops and the work of the Advisory Group. The Improved Pan-European Indicators for Sustainable Forest Management have been adopted at expert level at the MCPFE Expert Level Meeting, 7-8 October 2002 in Vienna, Austria.

STRUCTURE OF THE DOCUMENT

The document is structured into two sections:

I. Pan-European Quantitative Indicators for SFM

Section I comprises the recommended quantitative Pan-European Indicators for SFM under criteria 1 to 6 and the corresponding recommendations for the improvement of these indicators. Each indicator is structured according to the following headings which are shortly described below:

Indicator

The name of the indicator represents the brief reference to the full text of the indicator as agreed at the preceding workshops and by the Advisory Group.

The full text of the recommended improved indicators does not make reference to "change". However, change which is derived from the comparison of data from two different points in time should always be reported. Change is usually to be understood as "average change per year" and in some cases as "average change per decade".

Rationale

This paragraph explains the rationale behind the indicator, its scope and limitations. In some cases it also includes the explanation of the desired direction of change, the utility of the information provided through the indicator, the range of views expressed, possible threshold issues and pitfalls in interpretation and limitations in force of expression, as well as major links to other indicators or criteria.

International data provider

In this paragraph the relevant main international data providers are listed. The ultimate source of data is the national level (national statistics, national inventories and other national data providers). The references to the national level are not explicitly given for each indicator.

Measurement units

This paragraph provides the measurement units of the indicator for the status as well as for changes. If possible an error estimate should be included under each indicator.

Current periodicity of data availability

This paragraph shows the current periodicity of data availability on international level, e.g. through TBFRA.

Reporting notes

The reporting notes refer to classification categories as well as to instructions on how to collect the respective data which are not obvious from the wording of the full text of the indicator.

II. Pan-European Qualitative Indicators for SFM

This sections presents the recommended qualitative Pan-European Indicators for SFM.

The reporting format for the improved qualitative Pan-European Indicators for SFM addresses policies, institutions and instruments in general as well as more specifically by policy areas.

The improved qualitative indicators comprise a reporting format which is grouped into:

A) Overall policies, institutions and instruments for sustainable forest management
B) Policies, institutions and instruments by policy area

Indicators under part A aim to describe overall policy approaches for a sustainable forest management.

Indicators under part B aim to inform on specific policies for certain policy areas in addition to the information provided in part A. The intention is to describe the most specific policy objectives, name the main institutions relevant to achieve the objective and describe shortly the main policy instruments used. Additionally, significant changes since the last Ministerial Conference should be highlighted.

I. PAN-EUROPEAN QUANTITATIVE INDICATORS FOR SFM

Indicator 1.1: Forest area   5

Full text: Area of forest and other wooded land, classified by forest type and by availability for wood supply, and share of forest and other wooded land in total land area

Rationale:

Forest and other wooded land area contribute to various aspects of sustainable development. They enrich the landscape and are habitats for wild flora and fauna. They are places for leisure and recreation and are the economic basis for timber production as well as contributing to rural development, tourism and regeneration.

Changes in forest area are caused by afforestation, reforestation and deforestation and are a substantial indicator for sustainable forest management and the role of forests in the global carbon cycle.

Area of forest and other wooded land are key attributes in any forest survey, as many attributes describing forest ecosystems and sustainable forest management are presented as figures on a per hectare reference or in area related proportions.

This indicator is mainly linked to indicator 2.4, 3.5, 4.1, 4.2, 4.3, 4.4, 4.6, 4.9, 5.1 and 5.2.

International data provider: UNECE/FAO

Measurement units:

Status: ha
Changes: ha/yr.

Status: % of total land area
Changes: % of total land area/decade

Current periodicity of data availability: 10 years

Reporting notes:

Separate figures to be reported on:

- Area of forest, classified by forest type
- Area of forest available for wood supply, classified by forest type
- Area of other wooded land, classified by forest type
- Area of other wooded land available for wood supply, classified by forest type

Indicator 1.2: Growing stock

Full text: Growing stock on forest and other wooded land, classified by forest type and by availability for wood supply

Rationale:

This indicator is one of the basic figures of any forest inventory and useful for various purposes.

The standing volume of growing stock is closely related to the above ground woody biomass and provides data for calculating carbon budgets (link to indicator 1.4 (carbon stock)).

Further on this indicator is mainly linked to indicator 1.3, 2.3 and 2.4. There is also a cross-reference to Criterion 4 (Biodiversity).

International data provider: UNECE/FAO

Measurement units:

Status: m³
Changes: m³/yr.

Status: m^3/ha
Changes: m^3/ha/yr.

Current periodicity of data availability: 10 years

Reporting notes:

Separate figures to be reported on:

- Growing stock on forest land, classified by availability for wood supply and by forest type.
- Growing stock on other wooded land, classified by availability for wood supply and by forest type

CRITERION 1: MAINTENANCE AND APPROPRIATE ENHANCEMENT OF FOREST RESOURCES AND THEIR CONTRIBUTION TO GLOBAL CARBON CYCLES

Indicator 1.3: Age structure and/or diameter distribution

Full text: Age structure and/or diameter distribution of forest and other wooded land, classified by forest type and by availability for wood supply

Rationale:

Diameter and age class distributions provide insight in the future development of forests and are a prerequisite for SFM. On a national level for uneven-aged stands the diameter distribution should be given, while for even-aged stands the age class distribution is more appropriate. As forest management is changing towards more uneven-aged stands, the data on diameter distribution might gain importance in future.

This indicator is mainly linked to other indicators describing forest resources, health and vitality, productive and protective functions as well as biodiversity. Age class and diameter distributions support especially the interpretation of indicator 1.2 (growing stock) and also indicate the stability of forests (e.g. over-mature forests might collapse). In combination with figures on current state and changes of growing stock the indicator enables the evaluation of future potential growth and sustainable timber supply.

There is also a cross-reference to Criterion 4 (Biodiversity).

International data provider: UNECE/FAO

Measurement units:

Age-class distribution:

Status: % of area of forest available for wood supply
Changes: % of area of forest annually available for wood supply

Diameter distribution:

Status: Diameter class/ha
Changes: Diameter class/ha/yr.

Status: m³/ha
Changes: m³/ha/yr.

Current periodicity of data availability: 10 years

Reporting notes:

It has to be considered that data on age structure and on diameter distribution are reported on the national level and not on stand levels.

Diameter classes refer to diameter at 1.3 m height above ground (d.b.h., $d_{1.3}$). The following diameter classes should be reported:
- 0-19 cm
- 20-39 cm
- 40-60 cm
- > 60 cm

Separate figures to be reported on:
- For even-aged stands by forest types and by availability for wood supply
- For uneven-aged stands by forest types and by availability for wood supply

Indicator 1.4: Carbon stock

Full text: Carbon stock of woody biomass and of soils on forest and other wooded land

Rationale:

Carbon accumulates in forest ecosystems through absorption of atmospheric CO_2 and its assimilation into biomass.

Although the main goal of the Kyoto Protocol is to secure agreement on reducing emissions of greenhouse gases at source, it also recognises that carbon sequestration in forest ecosystems contributes to a reduction in the concentration of greenhouse gases in the atmosphere. Carbon is retained for long periods in the forest biomass and soils, and later in wood products.

Soil organic carbon is an important indicator of several soil functions and related processes.

This indicator is mainly linked to indicator 1.2.

International data provider:

- UNECE/FAO for carbon stock in woody biomass
- ICP Forests for carbon stock in soils (Level I)
- IPCC

Measurement units for carbon stock of woody biomass and of soils:

Status:. tonnes of CO_2 equivalent/ha
Changes: tonnes of CO_2 equivalent/ha/yr.

Current periodicity of data availability: 10 years

Reporting notes:

Separate figures to be reported on:
- Carbon stock of woody biomass on forest land
- Carbon stock of woody biomass on other wooded land
- Carbon stock of soils on forest land
- Carbon stock of soils on other wooded land

Indicator 2.1: Deposition of air pollutants

Full text: Deposition of air pollutants on forest and other wooded land, classified by N, S and base cations

Rationale:

Deposition of air pollutants is a major external stress factor that has been demonstrated to change soil condition and thus affect ecosystem stability. Direct or indirect adverse effects of deposition have also been demonstrated on forest tree health and ground vegetation composition. Air pollution may also predispose trees to the effects of drought and attack by fungi or insects.

This indicator is mainly linked to indicator 1.4, 2.2, 2.3, 2.4, 3.1, 4.5, 4.8, 5.1 and 5.2.

International data provider:

- ICP Forests (Level II)
- EMEP (Co-operative programme for monitoring and evaluation of the long range transmission of air pollutants in Europe)

Measurement units:

Status: kg/ha
Changes: kg/ha/yr.

Current periodicity of data availability: annually

Reporting notes:

Separate figures to be reported on:

- Deposition of N, S and base cations, each on forest land
- Deposition of N, S and base cations, each on other wooded land

Indicator 2.2: Soil condition

Full text: Chemical soil properties (pH, CEC, C/N, organic C, base saturation) on forest and other wooded land related to soil acidity and eutrophication, classified by main soil types

Rationale:

Soil condition is the basic source of ecosystem stability. Acidification and changes in chemical soil properties directly or indirectly affect crown condition and species composition. Tree resistance to insect attacks and diseases are often correlated to soil condition. In addition ecosystem stability is closely related to nutrient cycling. The existing tendency to acidification and eutrophication of soils and the associated changes in foliar chemistry of many parts in Europe is a potential area of concern.

The base saturation indicates the reserves left in the soil to buffer against further additions of e.g. acidifying substances. The C/N ration, the Cation Exchange Capacity (CEC) as well as the pH and organic C are important key indicators to describe soil acidity and eutrophication.

Depending on the respective soil property, the recommended soil depths are the organic layer and the top 20 cm.

This indicator is mainly linked to indicator 2.1, 2.3, 5.1 and 5.2.

International data provider:

- ICP Forests (Level I, Level II)

Measurement units:

Status pH: pH classes
Changes pH: Changes in pH classes/decade

Status CEC: cmol/kg
Changes CEC: cmol/kg/decade

Status C/N: C/N ratio
Changes C/N: Changes in C/N ratio/decade

Status organic C: g/kg
Changes organic C: g/kg/decade

Status base saturation: % (calculated as sum base cations/CEC)*100
Changes base saturation: changes/decade in %

Current periodicity of data availability: 10 years

Reporting notes:

Main soil types according to EC/UNECE:

- Podzols
- Cambisols
- Leptosols
- Arenosols
- Regosols
- Luvisols
- Histosols

- Gleysols
- Other soils

Separate figures to be reported on:

- pH, CEC, C/N, organic C, base saturation, each on forest land for each soil type mentioned above

- pH, CEC, C/N, organic C, base saturation, each on other wooded land for each soil type mentioned above

Indicator 2.3: Defoliation

Full text: Defoliation of one or more main tree species on forest and other wooded land in each of the defoliation classes "moderate", "severe" and "dead"

Rationale:

Crown defoliation is an indicator giving an estimation on tree condition. Defoliation depends on many stress factors and is therefore a valuable measure to describe the overall forest condition, although the causes of observed defoliation might be non-specific and not quantifiable.

This indicator is mainly linked to indicator 1.2, 2.1, 2.2, 2.4 and 3.1.

International data provider: ICP Forests (Level I)

Measurement units:

Status: % of total population
Changes: % of total population/yr.
Status: % of main tree species
Changes: % of main tree species/yr.

Current periodicity of data availability: annually

Reporting notes:

The degree of defoliation should be reported separately for single tree species on forest and single tree species on other wooded land, according to the following classification:

Class / Degree of defoliation	Needle/Leaf loss
2 / moderate	25 to 60 %
3 / severe	> 60 to < 100 %
4 / dead	100%

Indicator 2.4: Forest damage

Full text: Forest and other wooded land with damage, classified by primary damaging agent (abiotic, biotic and human induced) and by forest type

Rationale:

Biotic agents include e.g. insects and diseases, wildlife and cattle grazing in woodland. Abiotic agents include e.g. fire, storm, wind, snow, drought, mudflow and avalanche. Direct human induced damage factors include harvesting damages and damages by forest operations which cause severe economical losses and decrease of the ecosystems health and vitality (decrease in timber quality, rot, decay, destruction of natural regeneration, soil degradation). The effects are long lasting. A decrease of harvesting damage indicates gentle harvesting and logging methods and an increased ecological sense of responsibility. Also damages caused by wrong forest management should be indicated here.

Heavy attacks of insects and phytopathogene (bacteria, viruses, fungi) may cause major impacts to forests resulting in a risk for forest ecosystem functionality and an economic loss. Insect populations are also likely to react to long term change processes such as climate change. Furthermore, biotic damages may result in deterioration of tree condition not only in the year of occurrence but also in later years.

Forest fires are a major threat notably to Mediterranean forests with an average area burnt of several thousand hectares. While controlled burning might increase species diversity under controlled conditions, uncontrolled forest fires might have major negative consequences for the ecosystem, such as desertification, erosion, loss of water supply or economic loss.

Storm, drought, mudflow and avalanche damage are also serious threats to forest and other wooded land because they might also result in a loss of timber yield, landscape quality and wildlife habitat. However, impacts in the case of non-site adapted forest stands may be evaluated less serious than in the case of natural, semi-natural or site adapted ones since necessary reforestations may lead to side adapted forests in the future.

Pressure to forests and other wooded land is also caused by society in form of intensive tourist and recreational activities with negative side effects such as forest fire, contamination and vandalism.

Human induced damages by unidentifiable causes comprise e.g. damages of air pollution, traffic or cattle breeding.

This indicator is mainly linked to indicator 1.1, 1.2, 2.1, 2.3 and 3.1.

International data providers:

- ICP Forests (Level I)
- UNECE/FAO
- DG Environment

Measurement unit:

Status: ha
Changes: ha/yr.

Current periodicity of data availability: annually

Reporting notes:

Categories of biotic agents according to TBFRA 2000:

- Insects and diseases
- Wildlife and grazing

Categories of abiotic agents according to TBFRA 2000:

- Fire
- Storm, wind, snow, drought, mudflow, avalanche and other identifiable abiotic factor

Categories of human induced damages comprise e.g.:

- Damages by forest operations
- Damages by human induced fire

Separate figures to be reported on:

- Abiotic damages on forest and on other wooded land and by forest type
- Biotic damages on forest and on other wooded land and by forest type
- Human induced damages on forest and on other wooded land and by forest type

It is up to the countries to define the threshold level for the minimum size of damaged forest and other wood land to be reported. It is recommended that the minimum size be >1 ha.

The area damaged by various agents (no matter which kind of agent and how many subsequent agents) has to be counted just once!

CRITERION 3: MAINTENANCE AND ENCOURAGEMENT OF PRODUCTIVE FUNCTIONS OF FORESTS (WOOD AND NON-WOOD)

Indicator 3.1: Increment and fellings

Full text: Balance between net annual increment and annual fellings of wood on forest available for wood supply

Rationale:

This indicator highlights the sustainability of timber production over time as well as the current availability and the potential for future availability of timber. For a long run sustainability the annual fellings must not exceed the net annual increment.

The net annual increment is defined according to TBFRA 2000 as "average annual volume over the given reference period of gross increment less that of natural losses on all trees to a minimum diameter of 0 cm (d.b.h.)". Gross increment is the volume growth of survivor trees.

This indicator is mainly linked to indicator 2.1, 2.3 and 2.4.

International data provider:

- UNECE/FAO (for fellings)
- Eurostat: JQ annual data (for removals)

Measurement units:

Status: m³
Changes: m³/yr.

Current periodicity of data availability: 10 years

Reporting notes:

Separate figures to be reported on:

- Net annual increment of wood on forest available for wood supply
- Annual fellings of wood on forest available for wood supply

CRITERION 3: MAINTENANCE AND ENCOURAGEMENT OF PRODUCTIVE FUNCTIONS OF FORESTS (WOOD AND NON-WOOD)

Indicator 3.2: Roundwood

Full text: Value and quantity of marketed roundwood

Rationale:

Marketed roundwood includes all wood removed from the forest with or without bark, including wood removed in its round form, or split, roughly squared or in other form and sold by the forest owner. Value added processing steps are not included.

Marketed roundwood is a direct contribution to the income of the forest owner.

This indicator is mainly linked to indicator 3.3 and 3.4.

International data provider:

- UNECE/FAO
- Eurostat: JQ annual data

Measurement units:

Status: National currency/ha
Changes: National currency/ha/yr.

Status: m³/ha
Changes: m³/ha/yr.

Current periodicity of data availability: annually

Reporting notes:

Separate figures to be reported on:

- Value of marketed roundwood
- Quantity of marketed roundwood

CRITERION 3: MAINTENANCE AND ENCOURAGEMENT OF PRODUCTIVE FUNCTIONS OF FORESTS (WOOD AND NON-WOOD)

Indicator 3.3: Non-wood goods

Full text: Value and quantity of marketed non-wood goods from forest and other wooded land

Rationale:

Non-wood goods (NWGs) are e.g. game meat, pelts, fruits and berries, mushrooms and truffles, cork, medicinal plants, Christmas trees, honey or nuts.

Non-wood goods have an important economic value with regard to SFM. However, it has to be considered that depending on national laws the income of e.g. berry picking might belongs to the berry picker and not necessarily to the forest owner.

This indicator is mainly linked to indicator 3.2, 3.4 and 6.10.

International data provider:

- UNECE/FAO
- Eurostat: IEEAF

Measurement units:

Status: kg
Changes: kg/yr.

Status: National currency/kg
Changes: National currency/kg/yr.

Current periodicity of data availability: 10 years

Reporting notes:

Separate figures to be reported on:
- Value of marketed NWGs from forest land
- Value of marketed NWGs from other wooded land
- Quantity of marketed NWGs from forest land
- Quantity of marketed NWGs from other wooded land

The NWGs should be confined to the three most important goods (value) per country.

Indicator 3.4: Services

Full text: Value of marketed services on forest and other wooded land

Rationale:

Marketed services include, for instance, hunting licences, fishing licences, managed outdoor recreation areas or trails for mountain biking, horse riding, skiing and other recreational activities. Also environmental services like private contracts for conservation should be indicated here. Depending on national laws these marketed services of the forest contribute in general directly to increase the income of the forest owner.

This indicator is mainly linked to indicator 3.2, 3.3 and 6.10.

International data provider: UNECE/FAO

Measurement units:

Status: National currency/ha
Changes: National currency/ha/yr.

Current periodicity of data availability: 10 years

Reporting notes:

Separate figures to be reported on:

- Value of marketed services on forest land
- Value of marketed services on other wooded land

The marketed services should be confined to the three most important services (value) per country.

Indicator 3.5: Forests under management plans

Full text: Proportion of forest and other wooded under a management plan or equivalent

Rationale:

The existence of a forest management plan or equivalent indicates approaches of forest management towards pre-set goals, and have the intention to achieve those goals. The plan in general contributes to SFM, but can not guarantee it. On the other hand, sustainable management can be carried out without a written management plan.

The indicator quantifies the forest area, for which a planning process has been carried out and documented in written form. The management document can be operational (management plan) or less specific (equivalent). It is often registered or approved by public authorities, but this is not a pre-condition.

On a global level this indicator is of high importance.

This indicator is mainly linked to indicator 1.1, 1.2, 1.3. and 3.1. which express the results of management in the forest.

International data provider: UNECE/FAO

Measurement unit:

Status: % of total forest and other wooded land
Changes: % of total forest and other wooded land/yr.

Current periodicity of data availability: 10 years

Reporting notes:

Figures to be reported separately and exclusive:

The percentage of forest land and percentage of other wooded land with

a) management plans*

b) equivalents*

*see MCPFE definitions

CRITERION 4: MAINTENANCE, CONSERVATION AND APPROPRIATE ENHANCEMENT OF BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

Indicator 4.1: Tree species composition

Full text: Area of forest and other wooded land, classified by number of tree species occurring and by forest type

Rationale:

Species diversity and dynamics of forest and other wooded land ecosystems depend considerably also on the composition of tree species. Multispecies forest and other wooded land are usually richer in biodiversity than monospecific forest and other wooded land. However, it has to be considered that some natural forest ecosystems have only one or two tree species, e.g. natural subalpine spruce stands.

This indicator is mainly linked to indicator 1.1 and 4.3.

International data provider:

- UNECE/FAO
- ICP Forests (Level I)

Measurement units:

Status: ha
Changes: ha/yr.

Current periodicity of data availability: 10 years

Reporting notes:

Threshold to indicate a tree species:

>5% of tree cover or basal area by this tree species.

Separate figures to be reported on:

- For forest land by number of tree species occurring and by forest type.
- For other wooded land by number of tree species occurring and by forest type.

CRITERION 4: MAINTENANCE, CONSERVATION AND APPROPRIATE ENHANCEMENT OF BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

Indicator 4.2: Regeneration

Full text: Area of regeneration within even-aged stands and uneven-aged stands, classified by regeneration type

Rationale:

Natural regeneration contributes to conserving the diversity of the genotype and to maintaining the natural species composition, structure and ecological dynamics. However, it has to be considered, that natural regeneration is not always feasible to reach adequate management and conservation goals.

Regeneration types are natural regeneration, natural regeneration enhanced by planting, regeneration by planting and seeding, and coppice sprouting.

This indicator is mainly linked to indicator 1.1.

International data provider: UNECE/FAO

Measurement units:

Status: ha
Changes: ha/yr.

Current periodicity of data availability: 10 years

Reporting notes:

Classification of regeneration types according to TBFRA 2000:

- Natural regeneration
- Natural regeneration enhanced by planting
- Regeneration by planting and/or seeding
- Coppice sprouting

Separate figures to be reported on:

- Area of regeneration within even-aged stands, classified by regeneration type
- Area of regeneration within uneven-aged stands, classified by regeneration type

CRITERION 4: MAINTENANCE, CONSERVATION AND APPROPRIATE ENHANCEMENT OF BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

Indicator 4.3: Naturalness

Full text: Area of forest and other wooded land, classified by "undisturbed by man", by "semi-natural" or by "plantations", each by forest type

Rationale:

The degree of naturalness of forest ecosystems shows the intensity of human interventions. Different levels of utilisation intensity are characterised not only by changing structures but also by different species communities. The composition and structure determine the functional diversity and these factors constitute the biological diversity of an area. The existence of forest and other wooded land undisturbed by man, i.e. forests where natural processes and species to a considerable extent remain or have been restored, has a high conservation value for understanding the ecological principles, and for reference when setting up management priorities and plans and models for silvicultural planning.

Semi-natural forests can keep certain characteristics, allowing natural dynamics and biodiversity closer to the original ecosystem. Plantations usually represent ecosystems on their own, with artificial dynamics establishing species communities completely distinct from the original ecosystem.

In European conditions, most forests are "semi-natural", and it is desirable in the future to introduce one or more subdivisions along the spectrum from forests managed in a "close-to-nature" way to those whose management is close to plantation silviculture. In practice however, it is not yet possible to make a workable classification.

This indicator is mainly linked to indicator 1.1 and to indicators under Criterion 4.

International data provider:

- UNECE/FAO
- EEA
- Berne Convention data
- Council of Europe: EMERALD data

Measurement units:

Status: ha
Changes: ha/yr.

Current periodicity of data availability: 10 years

Reporting notes:

Separate figures to be reported on area of forest and on area of other wooded land for:

- undisturbed by man, by forest type
- semi-natural, by forest type
- plantations, by forest type

CRITERION 4: MAINTENANCE, CONSERVATION AND APPROPRIATE ENHANCEMENT OF BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

Indicator 4.4: Introduced tree species

Full text: Area of stands of forest and other wooded land dominated by introduced tree species

Rationale:

Non-indigenous tree species have been introduced for various reasons like forestry or gardening. Introduced tree species make a significant contribution to wood supply in many countries, however, through their ecological characteristics, e.g. competitiveness, may change the dynamics of forest ecosystems and may influence sites, species composition, structure and functional diversity. Some introduced species have become problematic, i.e. invasive., c.f. the guiding principles on combating alien invasive species adopted by the Convention on Biological Diversity (CBD).

This indicator is mainly linked to indicator 1.1.

International data provider:

- UNECE/FAO
- ICP Forests

Measurement units:

Status: ha
Changes: ha/yr.

Current periodicity of data availability: 10 years

Reporting notes:

Threshold for stands dominated by introduced tree species:
>50 % of tree cover or basal area by tree species introduced

Separate figures to be reported on:
- Area of stands of forest dominated by introduced tree species and of which invasive*
- Area of stands of other wooded land dominated by introduced tree species and of which invasive*

*Invasive species according to CBD definition

CRITERION 4: MAINTENANCE, CONSERVATION AND APPROPRIATE ENHANCEMENT OF BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

Indicator 4.5: Deadwood

Full text: Volume of standing and of lying deadwood on forest and other wooded land, classified by forest type

Rationale:

Deadwood (coarse woody debris) in form of snags (dead standing trees) and logs (dead lying trees) is a habitat for a wide array of organisms and after humification an important component of forest soil. Many species are dependent, during some part of their life cycle, upon dead or dying wood of moribund or dead trees (standing and fallen), or upon wood-inhabiting fungi or other species. Because of lack of deadwood many of the dependent species are endangered.

International data provider: UNECE/FAO

Measurement units:

Status:　m³/ha
Changes: m³/ha/yr.

Current periodicity of data availability: 10 years

Reporting notes:

Separate figures to be reported on:
- Volume of dead standing trees (snags) on forest land, classified by forest type
- Volume of dead standing trees (snags) on other wooded land, classified by forest type
- Volume of dead lying trees (logs) on forest land, classified by forest type
- Volume of dead lying trees (logs) on other wooded land, classified by forest type

Minimum length and diameter of standing and lying dead trees:
- Length: 2 m
- Diameter: It is up to the countries to define the threshold level for the minimum size of diameter to be reported. It is recommended that the minimum size be:
    - Standing deadwood: 10 cm d.b.h.
    - Lying deadwood: 10 cm mean diameter

CRITERION 4: MAINTENANCE, CONSERVATION AND APPROPRIATE ENHANCEMENT OF BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

Indicator 4.6: Genetic resources

Full text: Area managed for conservation and utilisation of forest tree genetic resources (in situ and ex situ gene conservation) and area managed for seed production

Rationale:

Genetic diversity is the ultimate source of biodiversity at all levels. Genetic resources of species should be conserved for the future, both to secure the width of genetic pools and to allow use of best provenances. A loss of variation may have negative consequences for fitness, for production and may prevent adaptive change in populations in response to climate change, and to properties such as for CO_2 storage.

This indicator is mainly linked to indicator 1.1.

International data provider:

- REFORGEN (FAO)
- EUFORGEN (FAO/IPGRI)

Measurement units:

Status: ha
Changes: ha/yr.

Current periodicity of data availability: 10 years

Reporting notes:

Separate figures to be reported on:

- Area managed for in situ gene conservation
- Area managed for ex situ gene conservation
- Area managed for seed production

Indicator 4.7: Landscape pattern

Full text: Landscape-level spatial pattern of forest cover

Rationale:

The long term survival of forest species may be threatened by fragmentation of the forest land into isolated patches of insufficient size.

The landscape-level spatial pattern of forest cover gives information on the size, shape and spatial distribution of forests in a landscape as it reflects the potential of a landscape to provide forest habitats. The monitoring of fragmentation in forests is not intended.

Fragmentation of forest land has historically occurred in many regions in Europe.

This indicator is mainly linked to indicator 1.1.

International data provider:

- EEA
- JRC
- CORINE Land Cover

Measurement units:

Status: Patch area classes
Changes: Changes in fragmentation in %/decade

Current periodicity of data availability: 10 years

Reporting notes:

Data could be collected by remote sensing.

Note:
- The measurement units and methodology need further clarification and harmonisation.
- An agreed definition of unfragmented area seems necessary.
- So far, the data availability does not enable a detailed analysis of this indicator.

CRITERION 4: MAINTENANCE, CONSERVATION AND APPROPRIATE ENHANCEMENT OF BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

Indicator 4.8: Threatened forest species

Full text: Number of threatened forest species, classified according to IUCN Red List categories in relation to total number of forest species

Rationale:

The most recognisable form of depletion of biodiversity lies in the loss of species (fauna and flora). Slowing down the rate of species extinction due to anthropogenic factors is a key objective of the conservation of biodiversity. Changes in forest species population levels may also provide an early warning of changes in vital forest ecosystem functions.

The majority of threatened species are limited in their geographical distribution to single countries. Therefore, this indicator is of high importance for the implementation of SFM at national level.

International data provider:

- IUCN (Red Lists)
- UNECE/FAO
- EEA

Measurement units:

Status: absolute number of selected taxa

Status: % of total number of selected taxa

Changes: absolute number of selected taxa/yr.

Current periodicity of data availability: variable

Reporting notes:

Threatened forest species are to be classified according to the following IUCN Red List categories:

- vulnerable
- endangered
- critically endangered
- extinct in the wild

and to be broken down to the following species groups as far as available data exist:
- birds
- mammals
- other vertebrates
- invertebrates
- vascular plants
- cryptogams and fungi

CRITERION 4: MAINTENANCE, CONSERVATION AND APPROPRIATE ENHANCEMENT OF BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

Indicator 4.9: Protected forests

Full text: Area of forest and other wooded land protected to conserve biodiversity, landscapes and specific natural elements, according to MCPFE Assessment Guidelines

Rationale:

Protected areas per se focus on the conservation of biological diversity and the maintenance of natural ecological processes.

Protected areas represent one of the oldest instruments for protecting nature and natural resources. Protected areas are included as a main pillar in nature conservation laws in all European countries.

This indicator is mainly linked to indicator 1.1, 4.3, 5.1, 5.2 and 6.11.

International data provider: UNECE/FAO

Measurement units:

Status: ha
Changes: ha/yr.

Current periodicity of data availability: 10 years

Reporting notes:

According to MCPFE Assessment Guidelines separate figures to be reported on:

- Area of forest land protected according to MCPFE Class 1.1
- Area of forest land protected according to MCPFE Class 1.2
- Area of forest land protected according to MCPFE Class 1.3
- Area of forest land protected according to MCPFE Class 2

- Area of other wooded land protected according to MCPFE Class 1.1
- Area of other wooded land protected according to MCPFE Class 1.2
- Area of other wooded land protected according to MCPFE Class 1.3
- Area of other wooded land protected according to MCPFE Class 2

CRITERION 5: MAINTENANCE AND APPROPRIATE ENHANCEMENT OF PROTECTIVE FUNCTIONS IN FOREST MANAGEMENT (NOTABLY SOIL AND WATER)

Indicator 5.1: Protective forests – soil, water and other ecosystem functions

Full text: Area of forest and other wooded land designated to prevent soil erosion, to preserve water resources, or to maintain other forest ecosystem functions, part of MCPFE Class "Protective Functions"

Rationale:

Forests have several very important protective functions for soil or for the surface under the forest cover, e.g. protection against erosion.

Forest cover has also many very important functions for the maintenance of water resources and of water cycles like the protection of water reservoirs (ground water and aquifers) or filtering of water, modification of water cycle and run-off.

In addition, forests fulfil other important ecosystem functions, e.g. maintenance of clean air, stabilisation of local climate, combating desertification, securing the timber line in alpine and polar areas, etc.

Whereas all forests fulfil these functions to some degree, for some forests, this is the primary management objective. The intention of this indicator is to identify those forests where protection of soil, water and other ecosystem functions is the primary management objective.

This indicator is mainly linked to indicator 1.1 as well as related to indicators under Criteria 2 and 4.

International data provider: UNECE/FAO

Measurement units:

Status: ha
Changes: ha/yr.

Current periodicity of data availability: variable

Reporting notes:

The total area with main management objective "Protective Functions", according to MCPFE Class 3 should be divided into areas with:

1) management clearly directed to protect soil and its properties, or water quality and quantity or other forest ecosystem functions (indicator 5.1); and

2) management clearly directed to protect infrastructure and managed natural resources against natural hazards (indicator 5.2)

For this indicator the area of 1) should be reported.

There might be an overlap with indicator 4.9 (protected forests): if this is the case, the fact should be indicated.

CRITERION 5: MAINTENANCE AND APPROPRIATE ENHANCEMENT OF PROTECTIVE FUNCTIONS IN FOREST MANAGEMENT (NOTABLY SOIL AND WATER)

Indicator 5.2: Protective forests – infrastructure and managed natural resources

Full text: Area of forest and other wooded land designated to protect infrastructure and managed natural resources against natural hazards, part of MCPFE Class "Protective Functions"

Rationale:

Forests fulfil important protective functions for infrastructure (e.g. roads, settlements against avalanches) but also for the protection of managed natural resources (e.g. vineyards, orchards, meadows) or directly for the protection of humans (e.g. from noise or visibility protection).

Whereas all forests fulfil these functions to some degree, for some forests this is the primary management objective. The intention of this indicator is to identify those forests where protection of infrastructure and managed natural resources is the primary management objective.

This indicator is mainly linked to indicator 1.1 as well as related to indicators under Criteria 2 and 4.

International data provider: UNECE/FAO

Measurement units:

Status: ha
Changes: ha/yr.

Current periodicity of data availability: variable

Reporting notes:

The total area with main management objective "Protective functions", according to MCPFE Class 3 should be divided into areas with:

1) management clearly directed to protect soil and its properties, or water quality and quantity or other forest ecosystem functions (indicator 5.1); and

2) management clearly directed to protect infrastructure and managed natural resources against natural hazards (indicator 5.2)

For this indicator the area of 2) should be reported.

There might be an overlap with indicator 4.9 (protected forests): if this is the case, the fact should be indicated.

Indicator 6.1: Forest holdings

Full text: Number of forest holdings, classified by ownership categories and size classes

Rationale:

The number of forest holdings is an important social indicator, especially for the sustainable development in rural areas due to significant changes within the last decades.

International data provider: UNECE/FAO

Measurement units:

Status: Absolute number
Changes: Absolute number/yr.

Status: ha
Changes: ha/yr.

Current periodicity of data availability: 10 years

Reporting notes:

Forest holdings are those in ISIC/NACE[1] 02.0 (Forestry, logging and related services).

Separate figures to be reported on, according to the following classifications:

Classification of forest holdings, according to TBFRA 2000*:*

A) Ownership categories

- In public ownership
- In private ownership
- Others

B) Size classes

- <10 ha
-   11 -100 ha
- 101 - 500 ha
- 501 - 10,000 ha
- >10,000 ha

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[1] ISIC = International standard industrial classification of all economic activities.

NACE= General industrial classification of economic activities within the European communities (Nomenclature générale des activités écono-miques dans les communautés Européennes).

Indicator 6.2: Contribution of forest sector to GDP

Full text: Contribution of forestry and manufacturing of wood and paper products to gross domestic product

Rationale:

From the national viewpoint, the contribution of forestry and manufacturing of wood and paper products to gross domestic product indicates its macro-economic importance but can also be used for the assessment on how forest management contributes to the overall sustainable development as well as, more specifically, to rural development and whether this contribution is sustainable.

Subsidies are not included in this figure.

International data provider: Eurostat (Economic Accounts/Forestry accounts)

Measurement units:

Status: Absolute figures in national currency
Changes: Absolute figures in national currency/yr.

Status: **%** of GDP
Changes: **%** of GDP/yr.

Current periodicity of data availability: annually

Reporting notes:

Separate figures to be reported on:

- Contribution of ISIC/NACE 02.0 (Forestry, logging and related services) to GDP
- Contribution of ISIC/NACE 20 ff (Manufacture of wood and articles in wood) to GDP
- Contribution of ISIC/NACE 21 ff (Manufacture of paper and paper products) to GDP

Indicator 6.3: Net revenue

Full text: Net revenue of forest enterprises

Rationale:

The level of net revenue of forest enterprises is an important indicator of the degree of economic sustainability of forest management. The net revenue of forest enterprises includes all sources of income of the forest owner directly related to forestry, including subsidies, excluding taxes.

From the national viewpoint, an increasing net revenue from forestry contributes to economic growth and to an increasing economic sustainability of the forest owners.

International data provider: Eurostat (Economic Statistics/Forestry account)

Measurement units:

Status: National currency/ha
Changes: Annual changes in national currency/ha

Current periodicity of data availability: annually

Reporting notes:

Forest enterprises are those in ISIC/NACE 02.0 (Forestry, logging and related services).

Indicator 6.4: Expenditures for services

Full text: Total expenditures for long-term sustainable services from forests

Rationale:

Forest owners, public and private, incur additional expenditures for producing a range of services that are demanded by the public free of costs. These are, for instance, expenditures to maintain protective forests against natural hazards, for preventing soil erosion or for protecting water quality as well as social services. These services are an important contribution to the quality of life and safety of humankind. It is essential to ensure that these services are maintained and that adequate public funding is provided to cover the necessary related expenditures. The total national expenditures for services from the forests should provide quantitative information on the efforts of countries to provide such forest services.

International data provider: --

Measurement units:

€ for status and changes

Current periodicity of data availability:

n.a.

Reporting notes:

Currently information on data availability is weak and data collection mechanisms have not yet been established. This indicator needs to be further elaborated before implementation.

Indicator 6.5: Forest sector workforce

Full text: Number of persons employed and labour input in the forest sector, classified by gender and age group, education and job characteristics

Rationale:

Employment provided by forestry is an important indicator for the social benefits generated by forests, especially for a sustainable rural development. At the same time, an adequate workforce in terms of numbers and qualifications is a critical input to SFM.

Employment in the forestry sector has been falling in almost all European countries due to rapid increases in labour productivity. This trend continues notwithstanding policy efforts to maintain rural employment. There are often trade-offs between economic viability and the maintenance or creation of employment. Indicators help to make such trade offs visible and amenable to decision making. Qualification requirements for the remaining workforce are higher due to the use of advanced equipment and machines as well as to growing attention to environmental parameters in forestry and mill operations. Particularly for work in the forest many countries face an ageing workforce and encounter difficulties to recruit new personnel.

International data provider:

- Eurostat (Social Statistics, Community Labour Force Survey)
- UNIDO (United Nations Industrial Development Organization, for data for ISIC 20 and 21)

Measurement units:

Status: Number of persons employed in full-time equivalents
Changes: Annual change in number of persons employed in full-time equivalents

Current periodicity of data availability: annually

Reporting notes:

Separate figures to be reported for

a) sectors:

- ISIC/NACE 02.0 (Forestry, logging and related services)
- ISIC/NACE 20 ff (Manufacture of wood and articles in wood) and ISIC/NACE 21 ff (Manufacture of paper and paper products)

and according to the following classifications:

b) gender categories:

- male
- female

c) age-group categories:

- <20 yr.
- 20-50 yr.
- >50 yr.

d) educational categories:

- Workers
- Technicians
- Managers/forest engineers

e) job characteristics:

- Salaried employees
- Contractors and contractor employees
- Forest owners

Indicator 6.6: Occupational safety and health

Full text: Frequency of occupational accidents and occupational diseases in forestry

Rationale:

Forestry continues to be one of the most hazardous sectors in most European countries. The prevention of occupational accidents and occupational diseases of the forestry workforce is an important social aspect of SFM.

Occupational accidents are occurrences arising out of or in the course of work which result in fatal occupational injuries or non-fatal occupational injury.

Occupational diseases in forestry comprise diseases contracted as a result of an exposure to risk factors arising from work activity.

International data provider: ILO (International Labour Organisation)

Measurement units:

Occupational accidents:

Status: Absolute number of occupational accidents with loss of time

Changes: Annual changes in number of occupational accidents with loss of time

Status: Fatal occupational accidents per 100 workers/yr.

Changes: Annual changes in number of fatal occupational accidents per 100 workers/yr.

Occupational diseases:

Status: Frequency of cases per number of persons exposed multiplied by number of years of exposure

Changes: Annual changes in frequency of cases per number of persons exposed multiplied by number of years of exposure

Current periodicity of data availability: annually

Reporting notes:

Separate figures to be reported on:

- Fatal occupational accidents
- Non-fatal occupational accidents
- Occupational diseases

Indicator 6.7: Wood consumption

Full text: Consumption per head of wood and products derived from wood

Rationale:

Sound use of wood, a renewable and environmentally friendly raw material, is an essential part of the sustainable development of the forest and forest products sector. Income from sales of wood and forest products is the most important element in the economic sustainability of the sector.

This indicator demonstrates the intensity of wood consumption, and may be correlated with other indicators, notably population and GDP.

Taken with indicator 6.8 (trade in wood), it indicates how the country's own forest resources contribute to the provision of raw materials for the domestic markets and those abroad and whether this is sustainable.

Primary processed products (i.e. sawnwood, wood based panels, pulp, paper and paperboard) as well as wood used in the rough and energy wood should be included. Secondary process products (e.g. furniture, paper products, joinery) should not be included to avoid double counting and because of problems with conversion factors.

The use of wood instead of non-renewable raw materials is an indicator of sustainable consumption patterns in a society.

International data provider:

- UNECE/FAO
- Eurostat

Measurement units:

Status: m³ EQ/head/yr.   (EQ = Equivalent)

Changes: Annual changes in m³ EQ/head/yr.

Current periodicity of data availability: annually

Reporting notes:

Only one figure to be reported on:

- Consumption (per head) of primary products, wood used in the rough and energy wood (aggregated in m³ EQ)

Indicator 6.8: Trade in wood

Full text: Imports and exports of wood and products derived from wood

Rationale:

International trade plays an important role in supplying renewable products at competitive prices to consumers world wide, and help to encourage the economic sustainability of the forest sector in many exporting countries. Knowledge of import and export figures in wood trade are necessary to fully understand information provided under indicator 6.7 (wood consumption).

International data provider:

- UNECE/FAO
- Eurostat

Measurement units:

Status: m³ EQ/yr.

Changes: Annual changes of m³ EQ/yr.

Current periodicity of data availability: annually

Reporting notes:

Separate figures to be reported on:

- Imports of wood and of products derived from wood (aggregated, in wood equivalent)
- Exports of wood and of products derived from wood (aggregated, in wood equivalent)

Indicator 6.9: Energy from wood resources

Full text: Share of wood energy in total energy consumption, classified by origin of wood

Rationale:

Wood is one of the major sources of renewable energy, whose importance is often under estimated, notably because of measurement problems. The objective of this indicator is to measure the relative importance of energy from wood compared to other sources of energy. This also helps to assess the sustainability of the energy sector in a country. Wood energy arises from a number of different sources, many of which are difficult to measure.

For the purposes of this indicator the origin of wood for wood energy includes:

- Wood used for energy taken directly from the forest and from trees outside the forest
- Wood processing residues used for energy
- Lignin, etc. from chemical pulping used for energy ("black liquors")
- "Post-consumer" wood energy

This indicator is mainly linked to indicator 1.4.

International data provider:

- Eurostat: Energy Statistics
- IEA (International Energy Agency)
- UNECE/FAO

Measurement units:

Status: Energy terms (TJ)/yr.
Changes: Annual changes in TJ/yr.

Status: % of national energy consumption
Changes: Annual changes in % of national energy consumption

Current periodicity of data availability: 10 years

Reporting notes:

Separate figures of the share of wood energy to be reported on for each of the following wood resources:

- Wood used for energy taken directly from the forest and from trees outside the forest, such as orchards, hedges etc. whether or not marketed or recorded in official statistics (the volumes concerned may be estimated on the basis of household energy use surveys).

- Wood processing residues used for energy including wood and bark from sawmills, wood based panel mills, pulp and paper mills, furniture and secondary processing plants.

- Lignin etc. from chemical pulping used for energy ("black liquors").

- "Post-consumer" wood energy, derived from used palettes and boxes, demolition wood etc.

Indicator 6.10: Accessibility for recreation

Full text: Area of forest and other wooded land where public has access for recreational purposes and indication of intensity of use

Rationale:

Ownership patterns and property rights affect public access to forest and other wooded land.

Access to forests enables people to benefit from the recreational value of forests which contributes to quality of life. Since many recreational uses are not marketable or based on legal or effective rights of free access, this indicator complements any data under indicator 3.3 (non-wood goods) and 3.4 (services) from the societal point of view.

Some activities by the visiting public may however be forbidden or restricted.

International data provider: UNECE/FAO

Measurement units:

Status: ha
Changes: Annual changes/ha

Status: % of total area of forest and other wooded land
Changes: Annual changes in % of total area of forest and other wooded land

Current periodicity of data availability: 10 years

Reporting notes:

Separate figures to be reported on:
- Forest area where access is available to the public for recreational purposes.
- Other wooded land where access is available to the public for recreational purposes.

Intensity of use should be reported according to one or more of the following figures:
- Area of forest with recreation as one of main management goals
- Area of other wooded land with recreation as one of main management goals
- Number of visits and visitors in forests
- Number of visits and visitors in other wooded land
- Number of recreation facilities in forests
- Number of recreation facilities in other wooded land

Indicator 6.11: Cultural and spiritual values

Full text: Number of sites within forest and other wooded land designated as having cultural or spiritual values

Rationale:

Forests have many cultural and spiritual values for societies and individuals, notably for religious, aesthetic and historical reasons. Although frequently intangible and/or personal often these values are manifested in particular sites which are increasingly being identified, listed and protected. The number of such sites officially designated is a rough indicator of the cultural and spiritual values assigned to its forests by society.

Examples of such sites are archaeological sites in forests, giant or unusual trees, the sites of historical events or of special ceremonies or customs, particularly beautiful landscapes, sites linked to famous individuals etc. In many cases the sites concerned will be small in area, so the unit is number of sites rather than area of forest.

This indicator is mainly linked to indicator 4.9.

International data provider: -

Measurement units:

Status: Absolute number of sites
Changes: Absolute number of sites/yr.

Current periodicity of data availability: variable

Reporting notes:

Separate figures to be reported on:

- Number of sites within forest land designated as having cultural or spiritual values
- Number of sites within other wooded land designated as having cultural or spiritual values

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II. PAN-EUROPEAN QUALITATIVE INDICATORS FOR SFM

A. Overall policies, institutions and instruments for sustainable forest management

A.1 National forest programmes or similar

A.2 Institutional frameworks

A.3 Legal/regulatory frameworks and international commitments

A.4 Financial instruments/economic policy

A.5 Informational means

B. Policies, institutions and instruments by policy area:

Ind. No.	Crit.	Policy area	Main objectives	Relevant institutions	Main policy instruments used			Significant changes since last Ministerial Conference
					Legal/ regulatory	Financial/ economic	Informational	
B.1	C1	Land use and forest area and OWL[2]						
B.2	C1	Carbon balance						
B.3	C2	Health and vitality						
B.4	C3	Production and use of wood						
B.5	C3	Production and use of non-wood goods and services, provision of especially recreation						
B.6	C4	Biodiversity						
B.7	C5	Protective forests and OWL						
B.8	C6	Economic viability						
B.9	C6	Employment (incl. safety and health)						
B.10	C6	Research, training and education						
B.11	C6	Public awareness and participation						
B.12	C6	Cultural and spiritual values						

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[2] OWL = other wooded land