

Handouts for the

**SECOND MEETING OF THE EXPERT GROUP
ON IMPLEMENTATION OF UPDATED PAN-EUROPEAN
INDICATORS FOR SUSTAINABLE FOREST MANAGEMENT**

17-18 October 2017, Vienna, Austria

**Background Information on Subsets of pan-European Indicators for Sustainable
Forest Management to address specific policy issues**

In autumn 2013 an EFI study (Wolfslehner et al., 2013) ascertained that the pan-European set of indicators for SFM is balanced and comprehensive in its approach. However, to address specific policy issues, it may be desirable to use a subset of the indicators to measure progress or to set goals, even to manage trade-offs. These subsets of indicators may be necessary only in certain pan-European regions, countries or for a limited time or purpose according to emerging issues or changing needs, even though they are constructed inside the framework of the general indicator set.

The EFI Study (EFI, 2013) as well as the findings of the Standing Forestry Committee ad hoc Working Group on sustainable forest management criteria and indicators (EC, 2015) have also shown, that data from SFM indicators are little known or used by other sectors (e.g. energy, bio-diversity, bioeconomy) or, in general, as a broader indicator sets applied to the whole of society.

One reason is that the information collected for the forest sector indicators is not in a form which can be easily used and understood by the other sectors. Vice versa information generated by other sectors is often not used in the forest sector, as the data is not collected and reported sector specific but for the whole economy or for the environment, rural development, etc. where the forest sector is part of. To remedy this, the indicator EG should consider institutions, organizations or processes which may have a need for specific forest indicator information. The indicator subsets should be designed with this need in mind being relevant to specific policy challenges or emerging issues and which may build bridges to other sectors.

The application at global level for the SDGs and the FRA reporting including CFRQ as well as on regional level (46 FOREST EUROPE Member States) or concerning particular needs of the European Union (28 MS, EEA 33) should be considered.

**Forest related indicators relevant for other institutions, organizations or processes
and policies**

Forest related indicators have been already requested (EC, 2015¹) or could be of particular relevance for institutions or organizations like EEA, Eurostat, FAO, OECD, UNECE or processes like UNFCCC, UNCCD, CBD and the European Union DGs with regard to the following topics which are explained in more detail below:

¹ EC Standing Forestry Committee Ad Hoc Working Group On Sustainable Forest Management Criteria & Indicators. Final report, 14.07.2015, 34 p.

- Rural development
- Environment & biodiversity
- Resilience
- Climate change mitigation and adaptation
- Energy
- Bioeconomy
- Forest and water
- Sub-set of key or headline indicators

Facilitated table discussions

To facilitate progress in EG work the experts will be requested to participate in parallel work at three tables for thematic discussions on the various subsets.

The outcomes of the 1st EG meeting in January 2017 in Zvolen should be considered. There the participants recommended:

- to use preferably FE indicators,
- to use preferably indicators containing data collected within forestry sector,
- to use preferably indicators collected in whole FOREST EUROPE region, not only EU,
- to consider implementation of hierarchical structure of indicators in subsets (e.g. FE headline indicators for theme, other relevant FE indicators for theme, relevant indicators from other sources),
- to involve representatives of the respective sectors in the discussion on subsets.

In the further development process of the indicator subsets it should be discussed:

- number of indicators per subset,
- use of sets resulting from the 1st WS or new selection,
- additional indicators to be included,
- Madrid Ministerial Declaration, paragraph 30: Use subsets of the pan-European criteria and indicators as appropriate for communicating the achievements of sustainable forest management, and explore the possibilities for various applications for them, notably in relation to other policies,

The results of the facilitated table discussions will be presented to the plenum on the morning of the second workshop day. The feedback of the plenum should be included in the further table discussions.

Subsets

The below table of subsets contain the list of possible indicators as proposed by Stefanie Linser as handouts for the 1st WS in January, including the recommendations of the EG made at the 1st WS. This is considered as the basis for the further discussions of the EG at the 2nd WS in Vienna.

Next to the data sources the tables also contain the rationales of each indicator, extracted from the FOTREST EUROPE Background Document on the improved pan-European indicators for SFM (2015). It should be discussed whether the rationales need adaptations to emphasise their importance for the subsets' issue. Also the forest-related SDG indicators are included in the below tables for consideration by the EG. The subsets are open for any further indicator proposals.

Subset theme: Rural Development

Possible indicators	Sources	Rationales from the background information for the updated pan-European indicators for SFM as of 3 June 2015, to be adapted according to the subset issue	EG recommendation, 01/2017
Forest and other wooded land area	FE ind. 1.1, CMEF* context ind., AICHI ind., SDG ind 15.1.1 and part of SDG ind.15.2.1	Forest and other wooded land area contribute to various aspects of SD. 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 SFM and the role of forests in the global carbon cycle.	to use
Contribution of forest sector to GDP (<i>in relation to that from agriculture</i>)	FE ind. 6.2	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.	added to the list
Net revenue	FE ind. 6.3	The level of net revenue of forest enterprises (public and private) 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.	added to the list
Recreation in forests	FE ind. 6.10	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.	added to the list
Investments in forests and forestry	FE ind. 6.4	This indicator focuses on governments' investments in public and private forests and revenues. This approach, which is consistent with the one applied in the FRA2015, should allow an analysis of public aspects of forest management financing.	added to the list
Protected forest areas	FE ind. 4.9, CMEF* context ind., SDG ind. 15.2.1	FE: Protected forest areas per se focus on the conservation of biological diversity and the maintenance of natural ecological processes. Protected forest areas represent one of the oldest instruments for protecting nature and natural resources. Protected forest areas are included as a main pillar in nature conservation laws in all European countries.	to be decided

Production of renewable energy from forestry	CMEF* context ind.		to be decided
Labour productivity in forestry	CMEF* context indr	Or FE 6.5 Forest sector workforce	to be decided
Land take	EEA, CSI 014, http://www.eea.europa.eu/data-and-maps/indicators/land-take-2/assessment-2		to be decided
Proportion of jobs in sustainable tourism industries out of total tourism jobs	SDG ind. 8.9.2		
Ration of [forest] land consumption rate to polulation growth rate	SDG ind. 11.3.1		
Mountain Green Cover Index	SDG ind. 15.4.1	The Mountain Green Cover Index indicates the conservation status of mountain environments based on the recognition that there is a direct correlation between green cover in mountainous areas and the capacity of those areas to fulfil their ecosystem roles. Monitoring the indicator over time will provide information on changes in forest, agricultural and other vegetation cover. A negative value could arise due to factors such as overgrazing, land clearing, urbanization, timber extraction, woodfuel collection and fire, and positive values could be linked to land restoration, reforestation, afforestation and sustainable agricultural practices.	
Natura 2000 forest areas	<i>DG Env</i> http://ec.europa.eu/environment/nature/natura2000/index_en.htm , CMEF* context ind.		not taken up
Energy use in agriculture, forestry and food industry	CMEF* context ind.		not taken up

*CMEF - Common Monitoring and Evaluation Framework

The valuation of forest ecosystem services should be integrated in assessment of forest sector contribution and compared with contributions of other sectors.

Subset theme: Environment & Biodiversity

Possible indicators	Sources	Rationales from the background information for the updated pan-European indicators for SFM as of 3 June 2015, to be adapted according to the subset issue. [Proposals for adaptations by LUB]	EG recommendation, 01/2017
Diversity of tree species	FE ind. 4.1	[Tree species diversity indicates frequency of tree species composition in forests]. Species diversity and dynamics of forest and other wooded land ecosystems depend considerably also on richness 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.	to use
Regeneration	FE ind. 4.2	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.	to use
Naturalness	FE ind. 4.3	The degree of naturalness of forest ecosystems shows the intensity of human interventions. Different levels of utilisation intensity [undisturbed by man, semi-natural, plantations] 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. []	to use
Deadwood	FE ind. 4.5, EEA SEBI 018	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. []	to use
Genetic resources	FE ind.4.6	Genetic diversity is the ultimate source of biodiversity at all levels. It ensures that forest trees can survive, adapt and evolve under changing environmental conditions. Genetic resources of forest trees should be conserved for the future, both to maintain the genetic diversity of tree populations and to ensure the availability of genetic resources for different uses and sites. A loss of genetic diversity may have negative consequences for fitness and productivity, and may prevent adaptation of tree populations to climate change, and to alter properties such as for CO ₂ uptake and storage.	to use
Protected forests	FE ind. 4.9, also part of: EEA SEBI 007, CBD ind., SDG ind. 15.2.1	Protected forest areas per se focus on the conservation of biological diversity and the maintenance of natural ecological processes. Protected forest areas represent one of the oldest instruments for protecting nature and natural resources. Protected forest areas are included as a main pillar in nature conservation laws in all European countries.	To use
Age structure/diameter distribution	FE ind. 1.3	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	Added to the list

		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. [] Age class and diameter distributions [] 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.	
Common forest bird species	FE ind. 4.10 Aichi ind. Wild Bird Index	Birds can act as excellent indicators of trends in the state of nature and of the sustainability of human land use and environmental health. Birds occur in all habitats, and can reflect trends in ecosystems, other animals and plants, and can be sensitive to environmental changes. This biodiversity indicator is an excellent way to report not only on general trends within wildlife populations, but also on the state of the wider environment. Birds are recognised as good indicators of environmental change and as useful proxies of wider changes in nature. A great deal of high quality data exists on birds and new data are relatively inexpensive to collect. One widely adopted index is "Wild Bird Index" (CBD Aichi) that measures average population trends of a suite of representative wild birds. The CBD includes "Wild Bird Index" (WBI), in main Aichi Biodiversity Target 12, and in secondary Aichi Target 5 and 7.	Added to the list
Invasive species	Part of FE ind. 4.4 Introduced tree species	Non-indigenous tree species have been introduced for various reasons like forestry or gardening. In-troduced 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) (above rationale is for the whole ind. 4.4).	added to the list
Proportion of countries adopting relevant national legislation and adequately resourcing the prevention or control of invasive alien species	SDG ind. 15.8.1		
Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected [forest] areas, by ecosystem type	SDG ind. 15.1.2		
Threatened forest species	FE ind. 4.8, also part of CBD ind.	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.	not taken up

Trends in abundance and distribution of selected species	EEA SEBI 001, CBD ind., UNCCD ind. So3-2, http://www.unccd.int/en/programmes/Science/Monitoring-Assessment/Pages/Impact-Indicators.aspx		not taken up
Number of threatened forest habitat types	Proposal from FE Goals and 2020 Target Report (could also be added under ind. 4.8)	Rationale of Ind. 4.8: 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.	not taken up
Natura 2000 forest area	<i>DG Env</i> http://ec.europa.eu/environment/nature/natura2000/index_en.htm EEA SEBI 008 (Sites designated under the EU Habitats and Birds Directives)		not taken up
Ecological Footprint	EEA, SEBI 023, http://www.eea.europa.eu/data-and-maps/indicators/ecological-footprint-of-european-countries/ , CBD/AICHI ind.		not taken up
Red List Index	EEA SEBI 002, IUCN, AICHI ind., SDG ind. 15.5.1		not taken up
Mountain Green Cover Index	SDG ind. 15.4.1	The Mountain Green Cover Index indicates the conservation status of mountain environments based on the recognition that there is a direct correlation between green cover in mountainous areas and the capacity of those areas to fulfil their ecosystem roles. Monitoring the indicator over time will provide information on changes in forest, agricultural and other vegetation cover. A negative value could arise due to factors such as overgrazing, land clearing, urbanization, timber extraction, woodfuel collection and fire, and positive values could be linked to land restoration, reforestation, afforestation and sustainable agricultural practices.	not taken up

Subset theme: Resilience

Possible indicators	Source	Rationales from the background information for the updated pan-European indicators for SFM as of 3 June 2015, to be adapted according to the subset issue	EG recommendation, 01/2017
Deposition of air pollutants	FE ind. 2.1	Deposition and concentration of air pollutants, such as nitrogen and sulphur, and ground-level ozone, represent a stress factor that has been demonstrated to affect forest ecosystem stability, health and productivity. Direct or indirect adverse effects of deposition have been demonstrated on soil condition, forest tree health and growth, and ground vegetation composition. Effects of ozone have been demonstrated on tree growth and health. Air pollution may also predispose trees to the effects of drought and attack by fungi or insects.	to use
Soil condition	FE ind. 2.2	Soil condition is the basic source of ecosystem stability, soil productivity, water protection and for the contribution that forested systems make to the global carbon cycle. It is therefore critical for sustainable forest management. Changes in soil condition may occur because of acidification and changes in chemical soil properties, and this can directly or indirectly affect decomposition rates, tree condition, growth and species composition, tree resistance to insect attacks and diseases. 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 therefore a potential area of concern. Changes in soil condition are also caused by forest management that may affect long-term carbon sequestration in soil and soil C and N content. 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 [] to describe soil fertility, acidity and eutrophication.	to use
Defoliation	FE ind. 2.3	Crown defoliation is an indicator giving an estimate of 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.	to use
Forest damage	FE ind. 2.4	Biotic agents [], abiotic agents [] and direct human induced damage factors [] 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 phytopathogens (bacteria, viruses, fungi) may cause major impacts to forests resulting in a risk for forest ecosystem health, 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 site 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. Several countries have forest lands damaged by point-source contamination (e.g. radioactive contamination), areas in which the multifunctionality of forests has been affected in a long term and forest management is a challenge.	to use

Forest degradation	FE ind. 2.5, part of SDG 15.3.1 ind.	<p>Land degradation and desertification on forests and other wooded lands, understood as a persistent reduction or loss of land biological and economic productivity, adversely affect the multiple provision of forests ecosystem goods and services. Causes and consequences of land degradation have multiple characteristics and vary within space, scale and context; hence measuring land degradation is a very complex multifaceted problem that needs to address bio-physical and societal processes. As a consequence of climate change, extreme meteorological events (e.g. drought, intense rains, wind-storms) are likely to increase in frequency and intensity. Vegetation productivity and soil stability and health are directly affected by these extremes, thus magnifying, accelerating and even driving land degradation. Therefore, an indicator related with forest areas affected by land degradation/desertification is of broad interest, not only for the countries affected by desertification, for which it is of utmost importance, but for other countries outside the climate scope defined by the UNCCD, which may also be affected by land degradation caused by whatever the cause or combination thereof. In fact, to increase the efforts to prevent forest degradation is part of one of the Global Objectives on Forests, but having objective information on forest degradation remains a challenge, as there are major problems on definition and measurement. Moreover, whilst there is no agreed definition of what constitutes “degraded forest land”, the concept of “land degradation” is agreed and well established within the United Nations Convention to Combat Desertification (UNCCD) to be applied at all levels. This definition is fully applicable to forest land and may be extended out of the scope of the UNCCD (arid, semi-arid and dry sub-humid areas). Thus, in accordance with the definition of land degradation as established in the text (article 1) of the UNCCD, “forest land degradation” can be understood as reduction or loss of the biological or economic productivity and complexity of forest and other wooded lands resulting from land use or from a process or combination of processes, including processes arising from human activities and habitation patterns such as: (1) soil erosion caused by wind and/or water; (2) deterioration of the physical, chemical and biological or economic properties of soil and (3) long term loss of natural vegetation. While highlighting the role of forests in recovering degraded land, this indicator would also emphasize that sustainable forestry activities can make a difference in recovering degraded land.</p>	to use
Genetic resources	FE ind. 4.6	<p>Genetic diversity is the ultimate source of biodiversity at all levels. It ensures that forest trees can survive, adapt and evolve under changing environmental conditions. Genetic resources of forest trees should be conserved for the future, both to maintain the genetic diversity of tree populations and to ensure the availability of genetic resources for different uses and sites. A loss of genetic diversity may have negative consequences for fitness and productivity, and may prevent adaptation of tree populations to climate change, and to alter properties such as for CO2 uptake and storage.</p>	to use
Forest area	FE ind. 1.1	<p>Forest and other wooded land area contribute to various aspects of SD. 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 SFM and the role of forests in the global carbon cycle.</p>	added to the list
Naturalness	FE ind. 4.3	<p>The degree of naturalness of forest ecosystems shows the intensity of human interventions. Different levels of utilisation intensity [undisturbed by man, semi-natural, plantations] 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 subdivi-</p>	added to the list

		sions 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.	
Introduced tree species	FE ind. 4.4	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).	to be decided
Damages from weather and climate-related events	EEA CLIM 039		to be decided
Exposure to forest fires	Proposal from FE Goals and 2020 Target Report		to be decided
Trends in land cover	UNCCD Ind SO2-1, http://www.unccd.int/en/programmes/Science/Monitoring-Assessment/Pages/Impact-Indicators.aspx SDG 15.2.1 ind. (Forest area net change rate)		not taken up

Subset theme: Climate change mitigation and adaptation → proposal of EG to split into separate categories for mitigation and adaptation

Possible indicators	Sources	Rationales from the background information for the updated pan-European indicators for SFM as of 3 June 2015, to be adapted according to the subset issue	EG recommendation, 01/2017
Growing Stock	FE ind. 1.2 and part of SDG ind. 15.2.1 (Above-ground biomass stock in forests)	[] The growing stock is closely related to the above ground woody biomass and provides data for calculating carbon budgets	to use
Carbon stock	FE ind. 1.4, AICHI Ind., UNCCD Ind SO3-1, http://www.unccd.int/en/programmes/Science/Monitoring-Assessment/Pages/Impact-Indicators.aspx	Although the main goal of the UNFCCC and its Kyoto Protocol is to secure the reducing of emissions of greenhouse gases, it also recognises that carbon sequestration in forest ecosystems may contribute to climate change mitigation by removing CO ₂ from the atmosphere. In the global carbon cycle, forests represent an important pool of carbon. Carbon accumulates in forest ecosystems through absorption of CO ₂ from the atmosphere ("removals") and its allocation into biomass and soils. Outside the forests, carbon may also accumulate in harvested wood products (HWPs). The net difference over time of the carbon stored in biomass, soil and HWPs is called "carbon stock change" and equals the net amount of CO ₂ emitted to or removed from the atmosphere. [] Soil organic carbon represents also an important carbon pool, and conservation of soil C is crucial to prevent potential positive feedbacks to climate change. Furthermore, soil organic carbon is also an important indicator of several soil functions and related processes. Both carbon stocks and carbon stock changes of the various pools (biomass, soil, HWP) are of relevance for this indicator.	to use
Greenhouse gas balance (emissions and sequestration)	EEA GHG emission database http://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer IPCC, ICP Forest UNECE/FAO		to use
Wood consumption	FE ind. 6.7	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, []. 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. The use of wood instead of non-renewable raw materials is an indicator of sustainable consumption patterns in a society.	to use
Public financial support and investments for forest adaptation	Proposal from FE Goals and 2020 Target Report		to use

Genetic resources	FE ind. 4.6	Genetic diversity is the ultimate source of biodiversity at all levels. It ensures that forest trees can survive, adapt and evolve under changing environmental conditions. Genetic resources of forest trees should be conserved for the future, both to maintain the genetic diversity of tree populations and to ensure the availability of genetic resources for different uses and sites. A loss of genetic diversity may have negative consequences for fitness and productivity, and may prevent adaptation of tree populations to climate change, and to alter properties such as for CO2 uptake and storage.	added to the list
Forest area	FE ind. 1.1	Forest and other wooded land area contribute to various aspects of SD. 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 SFM and the role of forests in the global carbon cycle	added to the list
Public support for mitigation	FE qual. ind.		added to the list
Forest composition and distribution	EEA, CLIM 034, http://www.eea.europa.eu/data-and-maps/indicators/forest-growth-2/assessment		to be decided
Energy from wood resources	FE ind. 6.9	Wood is one of the major sources of renewable energy, whose importance is often underestimated, 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.	to be decided
Naturalness	FE ind. 4.3	The degree of naturalness of forest ecosystems shows the intensity of human interventions. Different levels of utilisation intensity [undisturbed by man, semi-natural, plantations] 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.	not taken up
Introduced tree species	FE ind. 4.4	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).	not taken up
Electricity generated from renewable (wood) sources	Eurostat Tsien 050		not taken up

Share of (wood) renewables in gross final energy consumption	Eurostat SDI & EEA, ENER 028		not taken up
Forest Land Footprint	Footprintnetwork.org		not taken up

Subset theme: Energy

Possible indicators	Source	Rationales from the background information for the updated pan-European indicators for SFM as of 3 June 2015, to be adapted according to the subset issue	EG recommendation, 01/2017
Relative share of wood energy sources	Joint Wood Energy Enquiry (JWEE) http://www.unece.org/forests/jwee.html		to use
Relative share of wood energy uses	JWEE		to use
Share of woody biomass	JWEE, SDG ind. 15.2.1 (Above-ground biomass stock in forest)		to use
Share of energy use in calculated domestic consumption of woody biomass	JWEE		to use
Share of imports in wood fuel supply	JWEE		to use
Trade in wood	FE ind. 6.8	International trade plays an important role in supplying renewable products at competitive prices to consumers worldwide, and help to encourage the economic sustainability of the forest sector in many exporting countries.	to use
Energy from wood resources	FE ind. 6.9	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.	to use
Electricity generated from renewable [wood] sources	Eurostat Tsien 050		to use
Share of [wood] renewables in gross final energy consumption	Eurostat SDI & EEA, ENER 028 http://www.eea.europa.eu/data-and-aps/indicators/#c5=&c7=all&c0=10&b_start=0		to use

[Wood based] renewable energy share in the total final energy consumption	SDG ind. 7.2.1		
Availability and use of [woody] biomass resources for energy purposes	EU Renewable Energy Directive, Article 22 reporting, http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32009L0028&from=en		not taken up
Changes in commodity prices and land use within the EU MS associated with its increased use of [woody] biomass and other forms of energy from [woody] renewable sources	EU Renewable Energy Directive, Article 22 reporting		not taken up
Development and share of biofuels made from [woody] wastes, [woody] residues, non-food cellulosic material, and ligno-cellulosic material	EU Renewable Energy Directive, Article 22 reporting		not taken up
Estimated impact of the production of biofuels and bioliquids on biodiversity, water resources, water quality and soil quality within the MS	EU Renewable Energy Directive, Article 22 reporting		not taken up
Estimated net greenhouse gas emission saving due to the use of energy from renewable sources	EU Renewable Energy Directive, Article 22 reporting		not taken up

Subset theme: Bioeconomy

Possible indicators	Source	Rationales from the background information for the updated pan-European indicators for SFM as of 3 June 2015, to be adapted according to the subset issue	EG recommendation, 01/2017
Forest sector workforce	FE ind. 6.5	<p>Employment provided by forestry is an important indicator for the social and economic 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.</p> <p>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.</p>	added to the list
Contribution of forest sector to GDP	FE ind.6.2	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.	added to the list
Forest area (FAWS)	FE ind. 1.1	Forest and other wooded land area contribute to various aspects of SD. 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 SFM and the role of forests in the global carbon cycle.	added to the list
Increment and fellings	FE ind. 3.1	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. It is also of interest having the consideration about increment and fellings in total forest area. []	added to the list
Resource use [wood] -Primary production of [woody] biomass -Import of [woody] biomass to the EU -Global land use for [woody] biomass based consumption	COMEXT data, used for JFSQ, EUROSTAT, FAO AGMEMOD database, UNCOM-TRADE database, EFI Forest Product Trade Flow database		to be decided
Resource productivity -Ratio between gross domestic product (GDP) and domestic material	Eurostat SDI Headline Ind tsdpc100 http://ec.europa.eu/Eurostat/cache/metadata/DE/tsdpc100_esmsip.htm Also lead ind. in		to be decided

consumption (DMC)	the EU Resource Efficiency Scoreboard. Data so far not specific for the forest sector.		
Resource and materials efficiency -material and waste recycling and recovery rates -materials leaving the economy (land-fill, incineration without energy recovery) -Renewable energy -Water reuse and recycling	OECD Green Growth ind.		to be decided
Natural resources index [of timber resources] -use intensity -depletion rates	OECD, http://www.oecd.org/greengrowth/06%20NATURAL_RESOURCE_INDEX_VAN%20DE%20VEN%20pptx.pdf		to be decided
Share of renewable [wood based] energy in gross final energy consumption	Part of the EU Resource Efficiency Scoreboard EEA, t2020_31 http://www.eea.europa.eu/data-and-maps/indicators/renewable-gross-final-energy-consumption-4/assessment FAOSTAT, Joint Wood Energy Enquiry, Eurostat, ° http://ec.europa.eu/eurostat/cache/metadata/en/t2020_31_esmsjp.htm		to be decided
Indirect land use/ embodied land for agriculture and	Giljum et al. 2013		to be decided

forestry products			
Carbon footprint of the forest and harvested wood chain (carbon stock changes)	Eurostat, Global Footprint Network, IPCC LULUCF/AFOLU databases of emission factors Reports of GHG inventories from Countries to UNFCCC/Kyoto Protocol (carbon stocks changes in biomass and soils; also carbon stock and stock changes from HWP)		to be decided
Greenhouse gas balance (emissions and sequestration) 1) GHG emissions in total FWC and by sub-sectors classified by: -energy use (in non-industrial processes) -industrial processes -waste 2) Carbon sequestration in total FWC and by sub-sector on average for the reference year averaged over a period of 5 years classified by: -living woody biomass above and below ground, dead	EEA GHG emission database http://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer IPCC ICP Forest UNECE/FAO		to be decided

wood and in soils of forests -Harvested wood products -GHG balance in total FWC and by sub-sector			
Employment in forest-based bioeconomy sectors, and contribution to regional employment	FE ind. 6.5, Eurostat, GTAP database, LABOURSTA of ILO, Social Accounting Matrix		to be decided
Eco-innovation index	Eurostat, EU Innovation survey, Resource Efficiency Scoreboard		to be decided
Water footprint -of wood products incl. water embodied in imports & exports	http://waterfootprint.org/		not taken up
Red List Index of threatened species	EEA SEBI 002, IUCN, AICHI Ind. SDG ind. 15.5.1		not taken up

Subset theme: Forests and water

Forest and water are two important ecosystems and land cover types that influence European history and socio-economic developments. European forests provide more than 4 km³ of water annually to the European citizens by means of hosting 870.000 km of rivers (the total length of European rivers is about 3.5 million km) and almost 33% of 71 000 lakes with total area of 92 000 km² are located in forested catchments.

Forests play a vital role in sustaining water resources, maintain water quality and regulate water flows. At the same time forests and woodlands depend on water sources. The way we manage our forests is key to the quality of the water we drink, to protect us from natural hazards and to ensure the productivity of our lands. As global demand for freshwater rises and water gets scarcer it becomes more important than ever to maintain functioning ecosystems which can provide services.

Absorption of water via percolation and transpiration are main forest roles in hydrology which have been analysed by a vast number of studies since decades. Recently this role of forests is regarded as one of the important ecosystem services which can be benefited in tackling with climate change adaptation, flood prevention as well as provision of clean water.

Possible indicators	Source	Rationales from the background information for the updated pan-European indicators for SFM as of 3 June 2015, to be adapted according to the subset issue	EG recommendation, 01/2017
Protective forests – soil, water and other ecosystem functions	FE ind. 5.1	Forests have several very important protective functions. They protect the soil or the surface under the forest cover, e.g. protection against erosion. Forest cover has al-so 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, and the modification of water cycle and run-off. Forests fulfil also other important functions, e.g. maintenance of clean air, stabilisation of local cli-mate, combating land degradation / desertification, securing the timber line in alpine and polar areas, etc. In addition, forests fulfil important protective functions for infra-structure (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 protective functions to some degree, for some forests these are the pri-mary management objectives. The intention of this indi-cator is to identify those forests where (i) protection of soil, water and other ecosystem functions, and (ii) protection of infrastructure and managed natural resources respectively, are the prima-ry management objective.	to use
Water retention by forests	EEA water ac-count database		to be decided
Soil water content	FAO, ° http://www.fao.org/docrep/r4082e/r4082e03.htm		to be decided
Impact of forest mana-gement and harvesting on the small water sys-tems, lakes and rivers/ groundwater and on the nutrient balance of soil	partly Eurostat, FAO Aquastat		to be decided

Soil erosion by water – area eroded by more than 10 t/ha/year	Eurostat - Part of EU Resource Efficiency Scoreboard		to be decided
Change in the extent of water-related [forest] ecosystems over time	SDG ind. 6.6.1		

Subset theme: Key or headline indicators

At the 1st WS in January 2017 the EG supported, with some changes/recommendations for amendments, the set of indicators selected in 2015 by the EC Standing Forestry Committee ad hoc Working Group² on sustainable forest management criteria and indicators (interim list of key indicators to be used for communication purposes):

Category	Possible indicators	Source	Rationales from the background information for the updated pan-European indicators for SFM as of 3 June 2015, to be adapted according to the subset issue	EG recommendation, 01/2017
HORIZONTAL (ec-env-soc)	Forest area	FE ind. 1.1	Forest and other wooded land area contribute to various aspects of SD. 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 SFM and the role of forests in the global carbon cycle.	to use
	Growing stock	FE ind. 1.2	This indicator is one of the basic figures of any forest inventory []. The growing stock is closely related to the above ground woody biomass and provides data for calculating carbon budgets	to use
	Increment and fellings	FE ind. 3.1	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. It is also of interest having the consideration about increment and fellings in total forest area. []	to use
	Forests under management plan or equivalent instrument	FE qual. ind.	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 ca not guarantee it. On the other hand, sustainable management can be carried out without a written management plan (MCPFE Background Doc 2003).	to use
	Protective forests	FE ind. 5.1	Forests have several very important protective functions. They protect the soil or 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, and the modification of water cycle and runoff. Forests fulfil also other important functions, e.g. maintenance of clean air, stabilisation of local	to use

² EC, 2015: Standing Forestry Committee ad hoc WG on SFM Criteria&Indicators. Final report, 30.07.2015. http://ec.europa.eu/agriculture/sites/agriculture/files/forest/publications/pdf/sfcci-report_en.pdf

			climate, combating land degradation / desertification, securing the timber line in alpine and polar areas, etc. In addition, 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 protective functions to some degree, for some forests these are the primary management objectives. The intention of this indicator is to identify those forests where (i) protection of soil, water and other ecosystem functions, and (ii) protection of infrastructure and managed natural resources respectively, are the primary management objective.	
	Age structure	FE ind. 1.3	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. [] Age class and diameter distributions [] 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.	added to the list
ENVIRONMENTAL	Forest damage	FE ind. 2.4	Biotic agents [], abiotic agents [] and direct human induced damage factors [] 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 phytopathogens (bacteria, viruses, fungi) may cause major impacts to forests resulting in a risk for forest ecosystem health, 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 reforestation may lead to site 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. Several countries have forest lands damaged by point-source contamination (e.g. radioactive contamination), areas in which the multi-functionality of forests has been affected in a long term and forest management is a challenge.	to use
	Carbon stock	FE ind 1.4	Although the main goal of the UNFCCC and its Kyoto Protocol is to secure the reducing of emissions of greenhouse gases, it also recognises that carbon sequestration in forest ecosystems may contribute to climate change mitigation by removing CO2 from the atmosphere. In the global carbon cycle, forests represent an important pool of carbon. Carbon accumulates in forest ecosystems	to use

			through absorption of CO ₂ from the atmosphere (“removals”) and its allocation into biomass and soils. Outside the forests, carbon may also accumulate in harvested wood products (HWPs). The net difference over time of the carbon stored in biomass, soil and HWPs is called “carbon stock change” and equals the net amount of CO ₂ emitted to or removed from the atmosphere. [] Soil organic carbon represents also an important carbon pool, and conservation of soil C is crucial to prevent potential positive feedbacks to climate change. Furthermore, soil organic carbon is also an important indicator of several soil functions and related processes. Both carbon stocks and carbon stock changes of the various pools (biomass, soil, HWP) are of relevance for this indicator.	
	Protected forests	FE ind. 4.9	Protected forest areas per se focus on the conservation of biological diversity and the maintenance of natural ecological processes. Protected forest areas represent one of the oldest instruments for protecting nature and natural resources. Protected forest areas are included as a main pillar in nature conservation laws in all European countries.	to use
	Naturalness	FE ind. 4.3	The degree of naturalness of forest ecosystems shows the intensity of human interventions. Different levels of utilisation intensity [undisturbed by man, semi-natural, plantations] 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.	added to the list
	Genetic resources	FE ind. 4.6	Genetic diversity is the ultimate source of biodiversity at all levels. It ensures that forest trees can survive, adapt and evolve under changing environmental conditions. Genetic resources of forest trees should be conserved for the future, both to maintain the genetic diversity of tree populations and to ensure the availability of genetic resources for different uses and sites. A loss of genetic diversity may have negative consequences for fitness and productivity, and may prevent adaptation of tree populations to climate change, and to alter properties such as for CO ₂ uptake and storage.	added to the list
	Deadwood	FE ind. 4.5	Deadwood (coarse woody debris) in form of snags (dead standing trees) and logs (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. []	not taken up
	Tree species composition	FE ind. 4.1	Species diversity and dynamics of forest and other wooded land ecosystems depend considerably also on richness 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.	not taken up

SOCIO-ECONOMIC	Workforce	FE ind. 6.5	Employment provided by forestry is an important indicator for the social and economic 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.	to use
	Bioenergy production	FE ind. 6.9	Wood is one of the major sources of renewable energy, whose importance is often underestimated, 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.	to use
	Wood consumption	FE ind. 6.7	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, []. 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. The use of wood instead of non-renewable raw materials is an indicator of sustainable consumption patterns in a society.	to use
	Trade in wood	FE ind. 6.8	International trade plays an important role in supplying renewable products at competitive prices to consumers worldwide, and help to encourage the economic sustainability of the forest sector in many exporting countries.	to use
	Contribution of forest sector to GDP	FE ind. 6.2	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.	added to the list
	Net revenue	FE ind. 6.3	The level of net revenue of forest enterprises (public and private) 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.	not taken up

Global Core Set of Indicators

The EG supported in January 2017 also comments of the OLI delegates to indicators discussed at UNFF/FAO OLI³. The use and selection of those headline indicators should be further discussed.

This is the list of Global Headline Indicators as of June 2017 (Minutes of the Global FRA Meeting in Joensuu/Finland). This set will be further discussed at another OLI at 2.11.2017 in Rome.

	Global Core Set (draft as of June 2017)	unit
1	Forest area net change rate	%
2	Proportion of forest area located within legally established protected areas	%
3	Above-ground biomass stock in forest	Tonnes
4	Forest area designated and/or managed for protection of soil, water, infrastructure and managed natural resources [make consistent with FRA treatment of management objectives]	Ha
5	Employment related to the forest sector [including related downstream industry, research, education, tourism and NWFPs as far as possible]	Number FTE
6	Existence of strategies and institutions which explicitly encourage SFM	
7	Existence of national or sub-national forest assessment processes [use FRA 2020 terminology about characteristics of NFI process]	
8	Existence of a national or sub-national stakeholder platform [See FRA2020 definition of stakeholder platform]	
9	Proportion of forest area under a long-term forest management plan [See FRA2020 for definition of long term forest management plan]	%
10	Forest area under an independently verified forest management certification scheme [See FRA 2020 for definition of independently verified forest management certification scheme]	%; Ha
11	Volume of wood removals [reinstated]	m ³
12	Existence of traceability system(s) for wood products [caution needed: traceability may apply to legality, not sustainability]	State of development (operational, being developed, under consideration)
13	Proportion of forest area disturbed [if necessary reword to be consistent with FRA 2020]	% of forest area
14	Area of degraded forest [urgently requires further consideration]	% Ha

³ UNFF, 2016: Co-Chairs summary report of the **Organization-Led Initiative** on the development of global forest indicators to support the implementation of the 2030 Agenda on Sustainable Development and the IAF Strategic Plan. Rome, 28-30 November 2016. <http://www.cpfweb.org/45546-Of603660484e930da371288c867df9074.pdf>

15	Number of forest dependent people in extreme poverty [important and further work needed but not for FRA]	Number
16	Financial resources from all sources for the implementation of sustainable forest management [important and further work needed but not for FRA]	\$
17	Total supply of wood-based energy [reinstated because of importance in both developing and developed countries]	Mega joules
18	Net GHG sink/source of forests, and carbon storage in harvested wood products [UNFCCC monitoring process]	Tons C
19	Change in area of primary forests [to address Aichi target 5 using an FRA term]	Ha