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Pilot project on the System for the Evaluation of the Management of Forests (SEMAFOR)

Geneva Timber and Forest Discussion Paper 66



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NOTE

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ABSTRACT

The study presents the results of the SEMAFOR (System for the Evaluation of the Management of FORests) pilot study, which tested the method through voluntary assessment of the sustainability of forest management in European countries, on the basis of the Pan-European set of criteria and indicators. Scale-neutral indicators were developed and used to describe and assess the situation in 20 participating countries. Thresholds were used for the assessment indicators. Results which exceeded the thresholds were the subject of a discussion with national correspondents to check accuracy, put the data in context and describe the policy response, if any. The study presents detailed results, by indicator and by country, and discusses the main issues arising from the experience. This activity is experimental in nature: its only purpose is to check and test the method. The material presented does not constitute any formal conclusion or statement regarding the status of sustainable forest management in countries taking part in this exercise.

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Preface

The contemporary notion of “Sustainable forest management” has been at the centre of the forest policy discussion since the 1990s and is a complex concept, involving balance between social, ecological and economic dimensions as well as between generations and over time. Commitments have been made, principles and objectives defined and data collected, according to sets of criteria and indicators, at the national, regional and global levels. However, there has been no consensus on how to measure and monitor progress towards sustainable forest management, which necessarily involves bringing together many pieces of information, of widely varying types. This lack of tack and agreement has hindered evidence-based policy making as well as public understanding of the issues. In order to address this issue, the ECE/FAO Team of Specialist on Monitoring Sustainable Forest Management developed a proposal for a new approach, based on the pan-European set of criteria and indicators, to objectively assess progress towards sustainable forest management in European countries. The approach is based on the analysis of existing international data sets and dialogue with national correspondents to put the results in context. This paper presents a pilot study to test the approach, carried out on a voluntary basis. In 2017, the ECE Committee on Forests and the Forest Industry, and the FAO European Forestry Commission, at their joint session, will discuss, on the basis of the results of the pilot study, the approach and the possible next steps to monitor the complex question of sustainable forest management.

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The Team of Specialists on Monitoring sustainable forest management, under the leadership of Kari Korhonen and Stein Tomter, discussed the concept and earlier drafts in a detailed and constructive way, and reviewed progress and provided guidance at their regular meetings. In particular, a subgroup worked intensely in the early stages to develop the concept and agree the parameters and thresholds.

Special thanks are due to the national correspondents in the 20 participating countries, many of whom are also members of the Team of Specialists. They played a vital role, first by providing information through the pan-European reporting process, and then by engaging in a constructive dialogue on the accuracy, context and response to the results of the SEMAFOR study.

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Many thanks to all who have supported and participated in this challenging work.

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Note: This list contains the contact information for the national correspondents who were the focal point for the communication with the author. National correspondents often coordinated the feedback from the national level and many more experts have provided input to the analysis and clarification of the issues raised during the study.

List of abbreviations

CLRTAP	UNECE Convention on Long-range Transboundary Air Pollution
COFFI	Committee on Forests and the Forest Industry
EFC	European Forestry Commission
EMEP	Cooperative programme for the monitoring and evaluation of the long-range transmission of air pollutants in Europe
€	Euro
EEA	European Environment Agency
FAO	Food and Agriculture Organization of the United Nations
FAWS	forest available for wood supply
FOREST EUROPE	Ministerial Conference on the Protection of Forests in Europe (current name)
FOWL	Forests and other wooded land
GDP	Gross Domestic Product
ha	hectare
ICP Forests	International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests
ISIC	International Standard Industrial Classification of All Economic Activities
ITTO	International Tropical Timber Organization
m ³	cubic meter
MCPFE	Ministerial Conference on the Protection of Forests in Europe (former name)
Metsa2013	Joint session of the COFFI and EFC
NAI	Net annual increment
NFI	National Forest Inventory
NFP	National Forest Program
o.b.	over bark
RE	Roundwood equivalent
SEMAFOR	System for the Evaluation of the Management of Forests
SFM	Sustainable forest management
SFO	State Forest Organization
SoEF	State of Europe's Forests
UNECE	United Nations Economic Commission for Europe

1 Introduction and mandate

Assessment of progress towards sustainable forest management is one of the purposes of criteria and indicators of sustainable forest management, but has received less attention than other purposes, such as monitoring and providing a framework for policy making and consensus formation (European Forest Institute, 2013). Two studies on the state of Europe's forests (MCPFE, UNECE/FAO, 2007) (Forest Europe, 2011) addressed the issues, as did in different contexts, ITTO and the global Forest Resources Assessments, but with limited success and minimal policy impact. This unsatisfactory situation led the Joint United Nations Economic Commission for Europe (UNECE)/Food and Agriculture Organization of the United Nations (FAO) Forestry and Timber Section and the ECE/FAO Team of Specialists on Monitoring sustainable forest management to develop a new approach to the assessment of sustainable forest management. This approach was presented to the joint seventy - first session of the Committee on Forests and the Forest Industry and thirty - seventh session of the European Forestry Commission "Metsa2013", held from 9 to 13 December 2013 in Rovaniemi, Finland.

The analysis and assessment of sustainability of forest management are core elements of the Integrated Programme of Work 2014-2017 for the UNECE Committee on Forests and the Forest Industry and the FAO European Forestry Commission, adopted by the joint session of the Committee and the Commission "Metsa2013". In the framework of the implementation of this programme, the Committee and the Commission decided to undertake pilot reporting on sustainability of forest management at the national level.

The SEMAFOR concept is based on two major ideas: use of the Pan-European indicators to assess progress towards sustainable forest management, and a process of dialogue with national experts who put the recorded data in context. The aim is to combine objective and transparent measurement with a modulated approach which takes account of national circumstances, to produce a result which is credible and meaningful, going beyond description to assessment.

This Discussion Paper completes the SEMAFOR pilot study. A discussion on the possible future of this method will be convened at the joint seventy - fifth session of the Committee on Forests and the Forest Industry and thirty - ninth session of the European Forestry Commission in 2017, with reference, among other things, to the experience and lessons learned through the pilot study.

This Discussion Paper, resulting from the process outlined below was presented in draft form to the thirty-eighth session of the Joint ECE/FAO Working Party on Forest Statistics, Economics and Management in March 2016, and issued shortly thereafter, taking account of comments received from delegates.

It is stressed that the SEMAFOR pilot study presented here is experimental in nature: its only purpose is to check and test the method. The material presented does not constitute any formal conclusion or statement regarding the status of sustainable forest management in countries taking part in this exercise.

2 Process and timetable

This pilot study is the final result of a complex and detailed process, with the following stages:

- The method was developed by a subgroup of the Team of Specialists on Monitoring SFM, and finalised after the Rovaniemi meeting in 2013 and made widely available.
- Key elements are the choice of parameters and value of the thresholds for the assessment indicators. These were agreed by the team and widely distributed to national experts, in advance of the analytical phase.
- The Joint UNECE/FAO Forestry and Timber Section developed for each country a specific database, containing the parameters and the official data on which they are based, mostly extracted directly from the responses to the latest Pan-European enquiry.
- The national datasets were distributed to national correspondents from countries that reported to the global Forest Resources Assessment 2015 and Pan-European reporting 2015, with a request to review all parameters where the thresholds were exceeded, check data accuracy, put the results in context, and describe any policy response undertaken or foreseen.
- Country sheets were developed in cooperation between the Joint UNECE/FAO Forestry and Timber Section, the author and national correspondents, containing all the parameters as well as a discussion of the situation for indicators where the thresholds had been exceeded and a list of the outstanding data gaps. The country sheets and preliminary results were discussed by the team of specialists in November 2015 at Engelberg.
- Information on policy and institutions (qualitative indicators) was taken from national reports for the State of Europe's Forests 2015, although it was not possible to have these checked by national correspondents or the Team of Specialists. In fact, it appears that there are problems of definition and comparability for some of these, notably the ratio between administrative/policy staff and forest area. However, the data shown here are those published in SoEF2015, as it was not possible to undertake an in-depth analysis of officially published material – even though such a discussion does appear desirable.
- This Discussion Paper has been prepared based on the country sheets, and taking account of the remarks made at the meetings of the Team of Specialists and the Joint Working Party.

The author prepared datasets for 32 countries, which were sent out in early summer 2015. Twenty countries (Bulgaria, Bosnia and Herzegovina, Croatia, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Latvia, Lithuania, Norway, Romania, Serbia, Slovakia, Sweden, Switzerland, Ukraine, and United Kingdom) responded and worked with the author to generate the information presented in the pilot study. The twenty countries accounted for over 133 million hectares of forest, 63% of the European total (excluding Russian Federation) and covered most parts of Europe, except the South-West part of the region. International tables, with data for all countries participating in the pilot study, are

presented in annex 1. In these tables, data are shown for both context and assessment indicators. When the agreed thresholds are exceeded, this is marked in the international tables with an asterisk, stimulating users to consult the main text or the national tables. All cases where the thresholds are exceeded are presented and discussed in the main text, with a summary of the correspondent's comments. Tables containing the data by country, with the correspondents' comments are presented in annex 2.

Exceeding the threshold cannot be automatically understood as endangering sustainability. When a parameter exceeds the agreed threshold, this does not necessarily imply that there is a cause for concern. National circumstances or data issues may mean that this is not the case.

3 Method

3.1 Principles and methods of the system

The main features of the SEMAFOR approach are summarised below. This section is based on the briefing material used for national correspondents, and thus reflects the approach adopted throughout the pilot study.

- The system aims to report on the sustainability of forest management at the national or subnational¹ level. It aims to answer two questions:
 - What are the areas of concern with regard to sustainability in a given country?
 - How are the areas of concern being addressed now?
- The system is not designed to assess sustainability at the forest administration/forest management unit level.
- The reporting system also aims to communicate strong and weak aspects of a given country's situation with regard to sustainable forest management, on an objective basis, helping national policy makers to identify possible issues and to compare their situation with that of other countries.
- It aims to cover all aspects of sustainable forest management, as articulated by the Pan-European criteria. All criteria are considered equally important.
- The aim is to develop a reporting structure which is balanced, credible, objective and useful to policy makers: the latter requirement implies that a clear "story" emerges, and that possible areas of concern with regard to the sustainability of forest management are not concealed. In fact, one of the most important functions of the system is to identify areas where internationally agreed thresholds have been exceeded, so that corrective action, inside or outside the forest sector, can be taken if necessary.
- National and local circumstances vary widely, and there is no single ideal sustainable outcome, to which countries would be expected to aspire. It does not make sense to say that forest management in a given country is "very sustainable" or "more sustainable" (than elsewhere). The system therefore focuses on indicating whether or not the situation is sustainable, by identifying areas where agreed thresholds are exceeded, checking whether these are really areas of concern, and, if so, which instruments are being used to address them, rather than on identifying areas of exceptionally good performance. If no existing or emerging areas of concern with regard to sustainability are identified, the situation may be considered sustainable.
- Not all indicators are used for the assessment itself: there are many indicators in the Pan-European system, but some of them still have low data quality or are hard to use for a meaningful assessment. Furthermore, many indicators only describe the basic context, arising from geography, ecology and history². All the Pan-European indicators were reviewed and a decision taken for each as to whether it should be used for "assessment", "context" or "background". Thresholds are only identified for the

¹ For instance in provinces or autonomous regions which have responsibility for forest policy. It is not applicable at the level of counties or communes.

² For instance, should forestry in a country with 70% forest cover be considered "better" or "more sustainable" than forestry in a country with 20% forest cover? Significant reduction of forest area in either country would be a matter of concern, but the basic situation results from history and ecology and represents a starting point in the assessment of sustainable forest management, not an element of it.

“assessment” parameters. The reduction in the number of “assessment” parameters also makes the story clearer.

- The Pan-European indicators are very often expressed by a set of variables. For the purpose of this assessment, for each indicator, one or more size-neutral parameters, such as percentages and ratios, have been identified, making it possible to compare countries fairly. For the assessment parameters, thresholds are identified, which can indicate whether, for that topic, there might be concern about sustainability. If an indicator exceeded the agreed threshold, this triggered a review process with the national correspondent, putting the data in context and identifying any special circumstances. This process is described in the next section. The quantified threshold was thus the first filter of a process, not a rigid final judgement.
- The thresholds are the same for all countries, despite major differences between countries in their basic situations. The question of whether or not there should be common thresholds is addressed, in the light of the SEMAFOR experience, in the Discussion section below.
- The thresholds were proposed by the subgroup, for use in the SEMAFOR pilot study. They were reviewed by the team of specialists, and made widely available before the data were collected. Countries and the expert community were given the opportunity to comment on them, although few comments were received, perhaps because this is a pilot study. As this is a pilot study, they are in no way legally binding in other contexts.
- Policies and institutions, and governance in general, are a key part of sustainable forest management: indeed policy instruments are the main means of achieving sustainability and addressing threats. They are addressed in two ways: data on selected qualitative indicators from the Pan-European set are included in the context parameters, and national correspondents were asked to describe how the country is addressing any areas where the thresholds are exceeded.
- The results should therefore identify, by indicator and country, where countries have exceeded internationally agreed thresholds in the field of sustainable forest management, whether or not this is an area of concern, and how countries are addressing the issue if that is considered necessary. The stress on policy action to address areas of concern makes the exercise positive and provides good opportunities for communication with stakeholders.

Treatment of missing data: To implement evidence-based policy making, adequate information is necessary. In fact, truly sustainable forest management is impossible without adequate information for all the relevant parameters. However, when assessing the sustainability of forest management, “No data” is not the same as “Area of concern”: the situation for that indicator could be satisfactory, even excellent, but simply not measured. Therefore in the pilot study, “No data” is given a separate identity (i.e. not used to identify parameters where thresholds are exceeded, except for two indicators where data availability has been weak in the past), but absence of data is made clear in the reporting process.

Time reference: wherever possible, the warnings should refer to a recent period, typically the most recent five or ten years (depending on type of parameter), so that changes can be identified, and meaningful reassessments carried out regularly. When thresholds are exceeded, this situation should be put in context: continuation of long term trend, new development, special circumstances etc. For most forest linked parameters, there are few primary data for trends over shorter periods than five years.

3.2 Definitions of a few key terms

The following definitions of the three types of parameters and of the thresholds were used in the assessment system:

Context parameter: describes the situation of a country with respect to a given Pan-European indicator, but cannot be used to assess the sustainability of forest management. No threshold is identified for context parameters.

Assessment parameter: provides information useful to assess the sustainability of forest management in a country for a given Pan-European indicator. For each assessment parameter a threshold is identified.

Background parameter: cannot be used to provide reliable description or assessment of the situation with regard to sustainable forest management. Causes might be problems with data quality or methodology of data analysis, preventing meaningful use of the information available. No threshold is identified for background parameters.

Threshold: the first filter in the process of identifying an area of concern. When an assessment parameter exceeded the agreed threshold, the author contacted the national correspondent to check the accuracy of the information and to collect information on the background and circumstances. The author also asked the correspondent what action is being or will be taken by the country to address this area of concern, if this seemed necessary.

3.3 Parameters used in the assessment of sustainable forest management

The SEMAFOR pilot study reviewed all the Pan-European indicators of sustainable forest management, and classified them as "Context", "Assessment" or "Background" parameters. This classification, and the thresholds agreed for the assessment parameters, were applied all through the SEMAFOR pilot study. The strong and weak points of each assessment indicator are presented and discussed in the next section, in the light of the results of the pilot study.

Table 3.1 Criterion 1: forest resources and carbon

Indicator	Parameter	Category
1.1 Forest area	Area of forest as % of total land area (forest cover)	Context
1.1 Forest area	Forest/population ratio (ha of forest/head of population)	Context
1.1 Forest area	Annual average percent change ³ in forest area in most recent ten-year period	Assessment Threshold: any negative change
1.1 Forest area	Annual average percent change in area of forest available for wood supply (FAWS) in most recent ten-year period	Assessment Threshold: any negative change
1.2 Growing stock	Growing stock per hectare of FAWS	Context
1.2 Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	Assessment Threshold: any negative change
1.3 Age structure and/or diameter distribution	Imbalance in age structure	Background
1.4 Carbon stock	Annual average percent change in total forest carbon stock, last ten-year period,	Background ⁴

³ Calculated as percentage change over the whole period, divided by the number of years (i.e. no calculation of compound interest rates). Applies also to indicators 1.2 and 1.4

⁴ Changes in carbon stocks are important, and data are available. However, for assessment purposes, these trends will duplicate the trends for growing stock, as in most cases, carbon is estimated on the basis of growing stock

Table 3.2 Criterion 2: forest health and vitality

	Indicator	Parameter	Category
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication	Assessment Threshold: >80%
2.2	Soil condition	C/N index, median value for country	Assessment Threshold: <1
2.3	Defoliation	Percent of sample trees in defoliation classes 2+3+4	Background
2.4	Forest damage	Percent of forest area with damage ⁵ by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	Assessment Threshold: >5% ⁶
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	Assessment Threshold: >2%

⁵ Area with damage avoids double counting of damage from different causes. It describes a state in a given year, not the area where damage has occurred in a specific year.

⁶ This warning level will only be used if there is a significant improvement on data quality compared to SoEF 2011.

Table 3.3 Criterion 3: productive functions of forests

Indicator		Parameter	Category
3.1	Increment and fellingings	Ratio fellingings/NAI on FAWS, most recent ten-year period, in %	Assessment Threshold: >100%
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	Assessment Threshold: <€10/ha/year
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of forests and other wooded land (FOWL), €/ha/year of forest	Context
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	Context
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	Assessment Threshold: <50%

Table 3.4 Criterion 4: biological diversity in forest ecosystems

Indicator		Parameter	Category
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Assessment Threshold: any negative change
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Assessment Threshold: any decrease
4.3	Naturalness	Share of forest undisturbed by man in FOWL, %	Context
4.3	Naturalness	Share of plantations in FOWL, %	Context
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL, %	Context
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Assessment Threshold: any increase
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Assessment Threshold: any decrease
4.6	Genetic resources	Share of forest land managed for conservation of genetic resources, %	Background
4.7	Landscape pattern	Landscape pattern index: normalised connectivity per landscape unit and average proportion of "core natural" forest.	Background
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	Assessment Threshold: lack of information on parameter
4.9	Protected forests	Area of forest/FOWL strictly protected ⁷ for conservation of biodiversity as % of total forest	Assessment Threshold: <3%

⁷ MCPFE classes 1.1 and 1.2 only

Table 3.5 Criterion 5: protective functions of forests

Indicator		Parameter	Category
5.1	Protective forests – soil, water and other ecosystem functions	Change in area of forest designated as having protective functions (5.1+5.2)	Assessment Threshold: decrease
5.2	Protective forests – infrastructure and other managed natural resources		

Table 3.6 Criterion 6: socio-economic functions of forests

Indicator		Parameter	Category
6.1	Forest holdings	Share of publicly owned forest, most recent period, %	Context
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	Context
6.2	Contribution of forest sector ⁸ to GDP	Share of GDP taken by forest sector (not including forest industries), most recent period, %	Context
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period, in €/ha/year	Assessment Threshold: < €5/ha/year
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods, in €/ha/year	Context
6.5	Forest sector workforce	Forest sector labour force as % of total workforce	Context
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Assessment Threshold: increase in accident rate and/or lack of information on accident rates.
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, m ³ roundwood equivalent (RE), most recent 3-year average	Context
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ roundwood equivalent(RE)), most recent 3-year average	Context
6.9	Energy from wood resources	Share of energy from wood in national energy production, %	Context
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes from forests and outside forests, %	Context
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	Assessment Threshold: <85%
6.11	Cultural and spiritual values	No meaningful parameter found	NA

⁸ International Standard Industrial Classification and Statistical Classification of Economic Activities in the European Community, commonly referred to as NACE (for the French term "nomenclature statistique des activités économiques dans la Communauté européenne") (ISIC/NACE) Section: A - Agriculture, forestry and fishing; Division: 02 - Forestry and logging

Table 3.7 Pan-European qualitative indicators for sustainable forest management

Overall policies, institutions and instruments for sustainable forest management

Indicator		Parameter	Category
A.1	National forest programmes or similar	Date and status of NFP or similar	Context
A.2	Institutional frameworks	Number of staff who formulate and administer ⁹ forest policy and law, per hectare of forest	Context
A.3	Legal/regulatory framework	Date of forest law and of most recent formal statement of forest policy	Context
A.4	Financial instruments/economic policy	Total official transfer payments/subsidies, in €/ha/year of private forest	Context
A.4	Financial instruments/economic policy	Payment from public budget to state forest organisation (SFO) ¹⁰ , in €/ha/year of public forest	Context
A.4	Financial instruments/economic policy	Public expenditure on research, education and training per hectare of forest, €/ha/year	Context
A.5	Informational means	Existence of a formal communication and outreach strategy	Context

⁹ Excludes staff employed to manage public forests. If state forest organisation is also responsible for policy and administration, include only those staff, not those directly employed for forest management. Also excludes staff for research education and training, which are covered below. But should include (if possible) staff from other branches who administer forest policy, broadly defined: work safety inspectors, staff in environmental ministries (conservation of biodiversity) etc.

¹⁰ For data availability reasons, does not include contribution by SFO to public budget, (net transfer).

4 Results of the pilot study

This section briefly presents the results of the pilot study. It focuses on the assessment indicators as that is the new contribution of the SEMAFOR approach. For detailed descriptive material, readers are referred to other studies, notably State of Europe's Forests 2015 (Forest Europe, 2015), and the online interactive data base underlying it, which are based on the same data as the SEMAFOR pilot study. The results for the context and assessment parameters are shown in annexes 1 and 2. The context parameters are only presented in the results by country. This chapter presents and discusses the results, first by indicator, and then by country.

4.1 Results by indicator

The results of the pilot study are reviewed below, by assessment indicator (the agreed threshold is shown in brackets after the title of the indicator). The commentary presents the range of results, and the background explanations provided by national correspondents when the thresholds were exceeded, as well as comments from the author about the validity and usefulness of the indicator, and the threshold.

Indicator 1.1: Annual average percent change in forest area in most recent ten-year period (any negative change)

Result

Almost all countries showed moderate growth in forest area, of less than 0.5% per year. Five (Denmark, France, Ireland, Romania and Serbia) showed growth rates between 0.5 and 1.0% per year. Bosnia and Herzegovina recorded a reduction of 0.33% per year, while Sweden recorded a slight decline in area, of 0.05% per year. The Swedish correspondent pointed out that the change is so small that it is not statistically significant, and that according to the expert judgement of the national correspondents there has been no significant change in forest area between 2005 and 2015. The correspondent for Bosnia and Herzegovina did not comment on the trend, but pointed out that forest inventory in the country is still at an early stage, so it may be that the data are not comparable over time

Comments on the indicator

Changes in total forest area are at the basis of all other parts of sustainable forest management. In general a significant decline in forest area may be considered negative for sustainable forest management. However, two issues arise:

- When, as in Sweden, there is high forest cover, some reduction in forest area may be acceptable, even desirable, for instance in the interests of a balanced landscape with sufficient open areas.
- To focus on negative changes implies tacitly that the present situation for forest cover is sustainable. What of situations when this is not the case (for instance, if forest cover were considered "too low", necessitating a policy response such as an afforestation programme)?

Indicator 1.1: Annual average percent change in area of forest available for wood supply in most recent ten-year period (any negative change)

Result

Eleven countries reported an increase in area of forest available for wood supply (FAWS), with annual rates over 0.5% in France, Hungary, Ireland and Serbia. Eight countries recorded a decline in FAWS, with the fastest declines in Bulgaria (-1.45%/year) the Czech Republic (-0.9%/year) and Ukraine (-0.78%/year). However, none of the correspondents in the eight countries considered this decline a cause for concern: in some cases, the concept of "availability for wood supply" was not well defined at the national level, and there were issues of data quality and comparability. In many countries, however, the decline in the area of forest available for wood supply is due to an increase in area of forest protected (reclassification of "forest available for wood supply" to "forest protected for conservation of biodiversity"), and represents the achievement of a policy goal, and not a concern for sustainability.

Comment on the indicator

While it might be a matter of concern if forest available for wood supply was being lost to non-forest uses (settlements, infrastructure etc.), a change in management objectives, from wood supply to something else, such as biodiversity, is not a cause for concern, if carried out in a controlled way, based on consultation. For that reason, it may be desirable to delete this indicator from future assessments of progress towards sustainable forest management. Significant forest loss would become apparent through trends in total forest area. The original intention of this indicator was to identify loss of wood production capacity. This objective could also be achieved through monitoring changes in growing stock on FAWS.

Indicator 1.2: Annual average percent change in growing stock on FAWS in most recent ten-year period (any negative change)

Result

All countries except two showed increases, of up to 2.9%/year in Ireland, a clear indication that harvests are well below increment on FAWS, a rough indicator of sustainability as regards wood supply. The two countries which showed a decline in growing stock on FAWS did so as a result of the decline in the area of forest available for wood supply mentioned above. In these cases, a decline in the volume of growing stock was not an indicator of unsustainable harvest levels.

Comment on the indicator

Trends in growing stock (total, and on FAWS) are an essential part of wood supply forecasting, and thus of sustainability of wood supply. However, the possible distortions arising from changes in "availability" for wood supply should be taken into account. The "reductions" reported by some countries are not indicative of negative trends. Alternative parameters to be considered would be changes in growing stock on total forest, or alternatively on FAWS, but on a "like-for-like" basis: comparing growing stock on the same area of FAWS, or perhaps measuring changes on a per hectare basis. This might be challenging as several countries already have difficulty in identifying the area of forests "available for wood supply", and connecting other parameters (e.g. growing stock) to this area may be difficult.

Indicator 2.1: Percentage of natural ecosystem area at risk of eutrophication (>80%)

Result

This indicator is based on a survey of natural areas (not just forest) at risk of eutrophication, carried out at roughly five year intervals by the European Environment Agency (EEA). It measures the areas where the nitrogen depositions exceed critical levels in "all EUNIS classes"¹¹. The authors of the EEA study have informed the author that in fact "all EUNIS classes" has a different coverage in different countries, according to whether critical levels have in fact been established. As a consequence, "all EUNIS classes" comprises only (semi-) natural areas of a country, but not necessarily all of them. In other words, in the EEA study, 100% of "ecosystem area" comprises all ecosystems for which critical loads have been determined.

This indicator thus monitors a factor (nitrogen depositions) which puts stress on the ecosystem, taking account of the sensitivity of different ecosystems to this type of pollution by using the concept of critical loads. According to the most recent issue of the survey, nine of the SEMAFOR countries have less than 80% of their area at risk of eutrophication, and eleven countries have more than 80% (Bulgaria, Croatia, Czech Republic, Denmark, France, Hungary, Latvia, Lithuania, Serbia, Slovakia, Ukraine). There has been a steady improvement in these figures over the past 10-15 years: for the EU-28, in 1990, 84% of the area was at risk of eutrophication, but this had fallen to 63% in 2010. The EEA achieved comprehensive coverage so there are data for all 20 countries in the SEMAFOR pilot study.

Many SEMAFOR correspondents refused to comment on this indicator as it was supplied by a process with which they were not familiar and for which they had no responsibility. Furthermore, many correspondents stated that there was little evidence for actual eutrophication in their countries, even if a large area was "at risk of eutrophication", according to the EEA study

Comment on the indicator

This indicator is one of the few sustainable forest management indicators which monitors an external pressure on the ecosystem – most of the Pan-European forest indicators measure either the state or the response, in the DPSIR¹² vocabulary adopted by EEA. However, the indicator has been maintained in the revised set of Pan-European indicators. The data in this Discussion Paper are from the most recent study by EEA (European Environment Agency, 2014), issued in 2014 which replaces the 2008 study (Hettelingh, et al., 2008) used for the SoEF 2011 (MCPFE, UNECE/FAO, 2011). A possible question would concern the threshold of

¹¹ EUNIS is the EU classification of habitats. EUNIS classes that can be included for the assessment of empirical critical loads of nitrogen are A (Marine habitats), B (Coastal habitats), C (inland surface waters), D, E, F and G. The focus of the European critical load database is on D (Mires, bogs and fens), E (Grasslands and lands dominated by forbs, mosses or lichens), F (Heathland, scrub and tundra) and G (Woodland, forest and other wooded land). Countries that submit critical load data decide about the EUNIS classes they address (see the national report-annex in CCE Status Reports on www.wge-cce.org). For countries that do not submit data, the Convention on LRTAP has agreed that the CCE applies a background database.

¹² Drivers, Pressures, State, Impact, Response.

80%, especially as this results in a rather high number of countries which exceed the threshold (eleven), and of these, four had 99-100% of their habitats at risk of eutrophication.

It should be noted that this indicator measures an external stress on the ecosystem, creating a risk, and does not measure actual eutrophication observable at present in the forest. The authors of the EEA study pointed out, in a communication to the author, that when a critical load is exceeded, adverse effects to structure and function can occur with varying biological consequences, but not necessarily everywhere, nor with similar time horizons. Exceedances of critical loads affect sustainability and could in the long run lead to a disturbance of geochemical balances that could affect biomass accumulation. Exceedances may also affect resilience against e.g. storms. The ultimate effect of critical load exceedance also depends on interactions with other pollutants such as ozone.

Some SEMAFOR correspondents also referred to forest-based surveys, using sample plots, which also monitor nitrogen stress on the forest ecosystem. Any possible revision to the indicator set could explore the possibility of using a forest-specific indicator rather than the more general indicator provided by EEA. In fact the EEA study might be able to provide data on EUNIS habitat class G, which corresponds closely to forest and other wooded land. It might also consider measuring either the direct pressure on the forest ecosystem (i.e. depositions of nitrogen in forests) or its impact on the forest ecosystem (i.e. eutrophication).

Indicator 2.2: C/N index, median value for country (<1)

Result

All countries with data were above the threshold value, indicating no area of concern for soil quality, although data were missing for eight countries.

Comment on the indicator

The data for median national values were taken from SoEF 2011, as SoEF 2015 presents data by sample plots, in maps, with no data by country. As soil condition is an important point of sustainable forest management, and policy decisions which might influence this are taken at a national (or, sometimes, sub-national) level, it would be desirable in future SoEF reports, despite the technical problems, to present the data for this indicator, and others, such as 2.1, at the national, not the sample plot level. In this way trends for this indicator could also be monitored at the national level.

Indicator 2.4: Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage (>5%)

Result

Twelve countries reported damage below 5%, and two above 5% (Romania 22%, Hungary, 8.1%), with 6 countries unable to provide data. Hungary reported that there had been an increase of forest damage over the past 30 years, possibly attributable to climate change, but that there were major year-to-year variations, so that the present level is not considered to threaten the sustainability of forest management. The correspondent thought that more consideration should be given to the 5% threshold and monitoring trends. Close to nature forest management and adaptation to changed climate conditions are being considered.

The Romanian correspondent indicated that there could be measurement and comparability issues underlying the very high figure for damage in his country.

Comment on the indicator

The points raised by the Hungarian correspondent seem applicable elsewhere and there is need for more consideration of what level of damage may be considered as a threat to sustainability, taking account of the difficulty of aggregating information on different types of damage, and of strong annual fluctuations. There is also a clear need to improve data consistency and availability.

Indicator 2.4: Percent of forest area with damage by fire (ten-year average) (>2%)

Result

None of the pilot countries reported fire damage over 2%. However, few of the countries participating in the pilot study are significantly exposed to fire damage, as major South European countries with many fires did not participate in the pilot study.

Comment on the indicator

Although it is hard to make conclusions based on so few “fire countries”, questions would address how to deal with annual fluctuations in fire damage, and what is a “sustainable” level of fire damage. Is 2% too high a threshold? In SoEF 2015, most “fire countries” had damage under 0.4%, except for one, which ranged from 1.4% to 6.6%, the latter in a very bad year.

Indicator 3.1: Ratio fellings/NAI on FAWS, most recent ten-year period, in % (>100%)

Result

All countries except one (Sweden) were below the agreed threshold. Data were available for all countries. Sweden, which reported 110%, stated that during the observed period annual fellings were unusually high in relation to the net annual increment, essentially because of two major storms and a high demand for Swedish forest products that peaked in 2007. After 2007, the harvested volume in Sweden returned to more normal levels in relation to NAI on FAWS.

Comment on the indicator

Sweden also pointed out that the ratio between the total felling and the net annual increment may be misleading as the felling of natural losses is included in the numerator of the ratio but the natural losses have been excluded from the annual increment in the denominator. This is correct, but the cruder ratio (total fellings to net annual increment) was chosen as many countries have problems in distinguishing felling of natural losses from other fellings, leading to a risk of missing data. In Sweden, and several other countries, more sophisticated and sensitive methods of defining sustainable harvest levels, such as detailed wood supply outlook studies, are used: can these be used internationally?

Indicator 3.2: Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS (<€10/ha/year)

Result

All countries except one (Serbia) reported values well above the threshold, although eight countries had no data.

Comment on the indicator

The intention of this indicator is to monitor the market value of the production functions of forests and to assess whether this income is sustainable i.e. enough to provide a livelihood. Two questions may be asked:

- Is it possible to include revenues from non-wood goods and services? There is an indicator on this, but at present few countries are able to provide usable information, and the data received are fragmentary and often not comparable.
- What is a sustainable international level of income from roundwood sales, taking account of different ownership structures, and living standards in various regions? It may be that the present threshold, €10/ha/year, is too low, even for those countries with lower cost of living.

Indicator 3.5: Percentage of FOWL under formal management plan or equivalent (<50%)

Result

Many countries reported that 100% of their forests were under a management plan. Apart from one country with no data, only three countries reported that less than 50% of their forest and other wooded land was under a management plan. Their positions are as follows.

- In France, all felling is subject to administrative approval. The area under formal management plans is steadily increasing, but the reported figure (45%) does not include "equivalent" instruments, which, if included, would "change the picture considerably".
- In Norway (27.9%), the statistics only include areas assessed after the introduction of a new planning system in 2001. Areas with plans prepared before 2001 have not been included, although some of these may still have relevance to forest management in 2010. In Norway it is not mandatory for forest owners to have a management plan. There are many small farm forests, and they may be well managed even without a formal management plan
- In the UK (49.7%), all woodland areas are protected under felling regulations and many areas have additional protection through landscape designations. The principal conclusion that can be drawn for the ca 50% of woods without management plans is that little or no felling is taking place; many of these woods are small and associated with agricultural enterprises.

Comment on the indicator

The points raised by the countries where the threshold was exceeded are in fact widely applicable, notably the possibility of keeping harvest levels at sustainable levels through

legislation, rather than management plans, the problems of defining and reporting "equivalent" instruments, and the lack of relevance of formal plans for small holdings where wood production is not important. It may be that other countries took different lines in reporting these dimensions of the issue, so that the situation in a country reporting 100% management plans may be not substantially different to one reporting 50%, according to the choices made by the national correspondent. In addition the reporting does not address the issue of the rigidity and quality of plans, as well as the surveillance of their implementation.

Indicator 4.1: Share of multi species stands in FOWL, most recent period, % (any negative change)

Result

Nine countries reported an increase in multi-species stands, nine had no data and two reported a decrease. Croatia reported an apparent decline of 2.1% between periods, but this was due to administrative changes: larger, heterogeneous compartments had been broken down into smaller homogeneous units, thus reducing the share of "multi-species stands". The share of countries with no data is one of the highest for indicators depending on forest inventories for their source data. Bulgaria also reported a decline in multi-species stands, but indicated that this was due to reclassification of some low quality stands as coppice.

Comment on the indicator

Despite some technical problems of definition and measurement¹³ this indicator has provided useful information on the trend to more multi-species stands in European forest management, which is considered desirable from the biodiversity point of view in contrast to mono-specific plantations. However correspondents pointed out that there are also natural or semi-natural mono-specific forest stands, for instance of beech, so that the simple equation "multi-species implies more biodiversity" is not always applicable.

Indicator 4.2: Share of natural regeneration in total regeneration, change over most recent 10 year period, % (any decrease)

Result

Nine countries reported an increase in the share of natural regeneration, three had no data. On the other hand, eight countries reported a decrease. Some pointed to difficulties in monitoring regeneration methods, while several stated that, in their country, planting, seeding or assisted natural regeneration were officially preferred to natural regeneration in many cases, either because of technical difficulties in stand establishment, or because of the need to improve genetic characteristics of forests.

Comment on the indicator

There are certainly difficulties in defining and measuring the indicator, but the major issue is whether an increase in the use of natural regeneration should be considered desirable from the point of view of sustainability. From the point of view of genetic diversity, natural

¹³ How big is a "stand"? Does the presence of a few isolated trees of other species make a predominantly single species stand "multi-species"?

regeneration might be desirable, at least in the case of natural and semi-natural forests, as it maintains the genetic basis of local and adapted species: however, this may be at the expense of improved wood production due to improved planting stock (faster growth, improved resistance to insects, better form etc.), or even, on some sites (e.g. in Finland), of stand establishment. This indicator should be also analysed in the context of adaptation to climate change, and the necessity of transfer of genetic material. As this indicator is under Criterion 4 on biodiversity, the first significance was chosen when fixing the threshold. Nevertheless, it is recognised that this choice is open to criticism, and should be widely discussed in future assessment work.

Indicator 4.4: Change in share of invasive species, most recent 10 year period, % (any increase)

Result

Eleven countries reported no change or a slight decrease, six had no data. Three countries (Croatia, Hungary, Slovakia) reported an increase in invasive species: in all three countries the species concerned is *Robinia pseudoacacia* which is considered invasive, but which is also an intensively managed wood production species in many parts of central Europe, and is not considered a threat to sustainability in these countries, if correctly managed.

Comment on the indicator

Given the priority assigned to invasive species under the Convention on Biological Diversity (Aichi target 9), this assessment indicator appears justified, even though the situation in most European countries (from the forest perspective) does not seem a cause of concern. The ambiguous characteristics of *Robinia pseudoacacia*, which is both invasive and cultivated are an example of the many paradoxes and trade-offs which face policy makers: even though the situation with *Robinia pseudoacacia*, according to the correspondents, seems sustainable, it is only prudent to keep invasive species under observation, in a sustainable forest management perspective, as well as a "pure" biodiversity perspective. It should also be pointed out that some correspondents were confused in their responses between "introduced" species (the title of indicator 4.4) and "invasive" species, which are the focus of the assessment parameter. It is certainly not the intention of the SEMAFOR pilot study to use the share of introduced species as an indicator of sustainability.

Indicator 4.5: Change in volume of deadwood per hectare of FAWS between two most recent reports, m³/ha (any decrease)

Result

Eleven countries showed an increase in the volume of deadwood per hectare, and seven had no data. Two, Finland and Germany, showed a decrease. However both these countries pointed to methodological problems (comparability between deadwood inventories), and considered that the negative trend does not reflect reality. Both countries have policies in place to encourage an increase in the levels of deadwood, which however can only be effective over rather long time periods. It was also pointed out that while decay is a slow and progressive process, storms can cause major increases in deadwood in an unpredictable way, so deadwood accumulation is unlikely to show steady progress.

Comment on the indicator

Deadwood is widely accepted as one proxy for biodiversity in forest ecosystems, and has been incorporated into management objectives all over Europe. The results confirm this validity, but also show that it can be difficult to measure accurately trends over time, in particular aggregated to the national level, and that the data need careful analysis. As deadwood inventory methods have been improving, sometimes comparability over time has been compromised.

Indicator 4.8: Number of threatened forest tree species as % of total forest tree species (lack of information)

Result

Fifteen countries provided information on this ratio. Three provided information on the number of threatened tree species, but not of the total number of forest tree species, making it impossible to calculate a ratio – even though the number of threatened species is known. However even superficial inspection of the data provided shows that there are problems and that the data are not necessarily comparable between countries. The share of threatened species ranges from 0% in four countries to nearly 25%.

Comment on the indicator

It is acknowledged that trends in species present in forests, and how many are threatened is important information to monitor trends in biodiversity. However, there are many conceptual and practical problems, including definition of “forest tree species”, availability of surveys according to IUCN concepts (“Red Books”), as well as the significance of the data obtained¹⁴. For these reasons, a threshold was not established. However, it is encouraging that most countries in the pilot study were able to provide a figure for at least the number of threatened tree species.

Indicator 4.9: Area of forest strictly protected for conservation of biodiversity as % of total forest (<3%)

Result

Eleven countries reported that more than 3% of their forest area was “strictly protected” and two had no data, while in seven the area of strictly protected forest is below the agreed threshold of 3%¹⁵. All of those countries stressed their commitment to protection for biodiversity, as well as specific features of the natural situation as regards protection, and whether or not the arrangements in their countries complied with the definition of “strict” protection. Some pointed out that the rules in their country for protected areas in MCPFE category 1.3 (not considered strict protection for the purposes of SEMAFOR) were in fact

¹⁴ For instance do high numbers of threatened species imply imminent danger, excellent surveys, or that many species are on the edge of their natural range – surviving where without protection, they might have become extinct in that country? And does “forest tree species” imply all trees which can occur in forest stands (excluding hedgerows and other formations) or those which frequently occur in forests? And what of exotic species in arboreta or other special management areas?

¹⁵ Note that this indicator addresses share of **strictly** protected forest, not all protected forest. Experience has shown that countries interpreted the area of protected forest in so many different ways that it was not possible to achieve any comparability between countries when total protected area is under consideration.

strict. One basic problem is that category 1.3 "Conservation through active management" covers a wide range of protection systems, some of which are in fact quite strict while others differ only slightly from "normal" active management. As one correspondent said, "The question of classification deserves an in-depth discussion between countries".

Comment on the indicator

Two important questions arise for this sensitive indicator: "what constitutes "strict" protection?" and "what should be the threshold?" As mentioned above, an in-depth discussion of the former issue is needed to achieve progress, given the wide variety of schemes in place, all intended to conserve biodiversity, but using different levels of protection tailored to specific national circumstances. The threshold question is also difficult: Aichi Target 11 calls for 17% of land area to be "conserved through effectively and equitably managed, ecologically representative and well-connected systems, of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascapes." According to State of Europe's Forest 2015, 12.2% of Europe's forests are protected under MCPFE classes 1.1- 1.3, and 4.6% in classes 1.1-1.2 (the definition of strict protection for SEMAFOR), but this share varies widely, for reasons which are quite local and specific. Thus 3% appears a satisfactory initial approximation for a threshold for strict protection, within the 17% Aichi target for broader protection. However, an in-depth discussion of this threshold would be desirable.

Indicators 5.1 and 5.2: Change in area of forest designated as having protective functions (5.1+5.2) (decrease)

Result

In thirteen countries, the area of forest designated as having protective functions was stable or expanding, and three countries had no data. In four countries (Bulgaria, Finland, Hungary and Ukraine), this area declined. However these countries stated that the protective functions were in any case guaranteed by forest law, and that the apparent reduction was due to reclassification, notably as forest protected for biodiversity. This is a purely administrative change as the protective functions are guaranteed under both regimes.

Comment on the indicator

This indicator suffers from difficulty distinguishing between the area of forest which has protective functions, the area "designated" as having protective functions and the area where those protective functions are in fact guaranteed. In particular, in some forest laws, the protective functions of all forests are guaranteed by law, making a separate "designation" unnecessary. In addition, the importance of the protective functions is very high in some areas, notably in mountains, and less important elsewhere.

Indicator 6.3: Net entrepreneurial revenue per hectare, most recent period (<€5/ha/year)

Result

Twelve countries reported net revenue of over €5/ha/year, and three provided no data. In one country (Bosnia and Herzegovina) net revenue was very low. In threecountries (Norway, Switzerland, UK) net revenue in the most recent period was negative, chiefly due to high

costs of forest management, combined with low wood prices. In Switzerland, the correspondent identified different reasons for this negative revenue:

- Structural: small forest ownership hinders efficient management
- Economic: the high value of the Swiss franc in comparison to the Euro reduces market opportunities while production costs in Switzerland remain high.
- Political: ecosystem services are only partly compensated.

In the Swiss forest policy 2020 one goal addresses the increase of economic revenues of the forest owners.

Norway mentioned that in the period covered, timber harvest and prices were low.

Comment on the indicator

This is one of the few indicators to address the socioeconomic dimension of sustainability. In 2015, unlike in previous years, data are available for enough countries to gain an overview of the situation. Given this improvement in data, the main question now concerns setting the threshold. €5/ha/year is a relatively low figure in most parts of Europe, but there are countries where this is not the case. Should the threshold be expressed in absolute terms (€/ha) or in a more relative way, perhaps as a ratio to the national average revenue? Might it be possible to calculate how many hectares of forest were needed to earn the national average income or minimum wage?

Indicator 6.6: Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010) (Increase in accident rate and/or lack of information on accident rates)

Result

Fifteen countries recorded a drop in the accident rate. The UK reported an increase, while four countries provided no data. Germany was not able to calculate an accident rate, as data on the total workforce could not be calculated, nevertheless the absolute number of accidents has fallen. The UK attaches great importance to safety, health and welfare and continues to focus on improvement across the sector; it considers the recorded small increase statistically not significant and contrary to the long term (1990-2010) downward trend, particularly given increased harvesting activity.

Comment on the indicator

Until 2015, data quality for this indicator was rather weak, but it has improved and it is now possible to identify trends – although it is still hard to understand the reasons underlying the wide differences between national accident rates. Because of the previous very weak data situation, and the feeling that it was unsustainable to be unable to monitor accident rates, lack of information, for this indicator and indicator 4.8 only, was considered as exceeding the threshold (as well as an increase in the rate). Given the improved data situation, it may be possible to drop the data availability threshold in future SEMAFOR work, in order to focus on real trends.

Indicator 6.10: Area accessible for recreation as % of area of FOWL, most recent year (<85%)

Result

Fifteen countries reported that more than 85% of their forest area was accessible for recreation, while four (France, Ireland, Ukraine, UK) reported lower, sometimes much lower, figures. The underlying reasons are cultural and legal; access for recreation is not a polarising issue anywhere. Most of the countries reporting lower accessibility for recreation were those with significant areas of private forests and a legal system which does not allow uncontrolled access to private property – even when, in practice, there are no obstacles to forest recreation.

Comment on the indicator

The indicator seems to provide reliable information, although, for the reasons discussed above, the legal differences as regards public access may be misleading with regard to the actual use of the forest for recreation. Some of the countries with relatively low shares of forest “accessible for recreation” (e.g. France, with 25%, which is the public forest only) are those where the forest is used most intensively for recreation, around cities, in tourist areas and elsewhere. Ideally, there would be an indicator of actual use of the forests for recreation (based on visitor surveys and other monitoring methods), which all consider an important function of forests, but it appears that national level data are not available in enough countries to make this possible.

Overview of all assessment indicators

Table 5.1 summarises the information above, by indicator. It shows that about 67% of the records were below the agreed thresholds. Furthermore, the discussion above demonstrates that once national circumstances are taken into account, those records which did exceed the thresholds do not necessarily represent a threat to sustainability. About 15% of the records were no data. Five of the indicators had more than 5 countries out of 20 with no data: 2.2 (soil condition), 2.4 (forest damage, except fire), 3.2 (value of marketed roundwood), 4.1 (share of multi-species stands) and 4.4 (introduced tree species). Uncertainty should be considered greater for those indicators.

For eight indicators, 15 or more countries were below the agreed threshold: 1.1 (change in forest area), 1.2 (change in growing stock), 2.4 (fire damage¹⁶), 3.1 (ratio of fellings to net annual increment), 3.5 (forests under management plan), 4.8 (threatened forest tree species), 6.6 (occupational safety and health) and 6.10 (accessibility for recreation). However, as mentioned above, also those countries with records which exceeded the thresholds have, in most cases explained that there is no cause for concern, either because of data issues or because of specific national circumstances.

Overall therefore, taking account of the indicators recorded, the explanations given and level of thresholds agreed for the pilot study, there is no evidence of significant areas of concern with regards to sustainable forest management in the twenty countries which participated in the pilot study.

¹⁶ Practically no countries in southern Europe participated in the pilot study, so this is not surprising.

Graph 5.1 Data availability and information on threshold by indicator

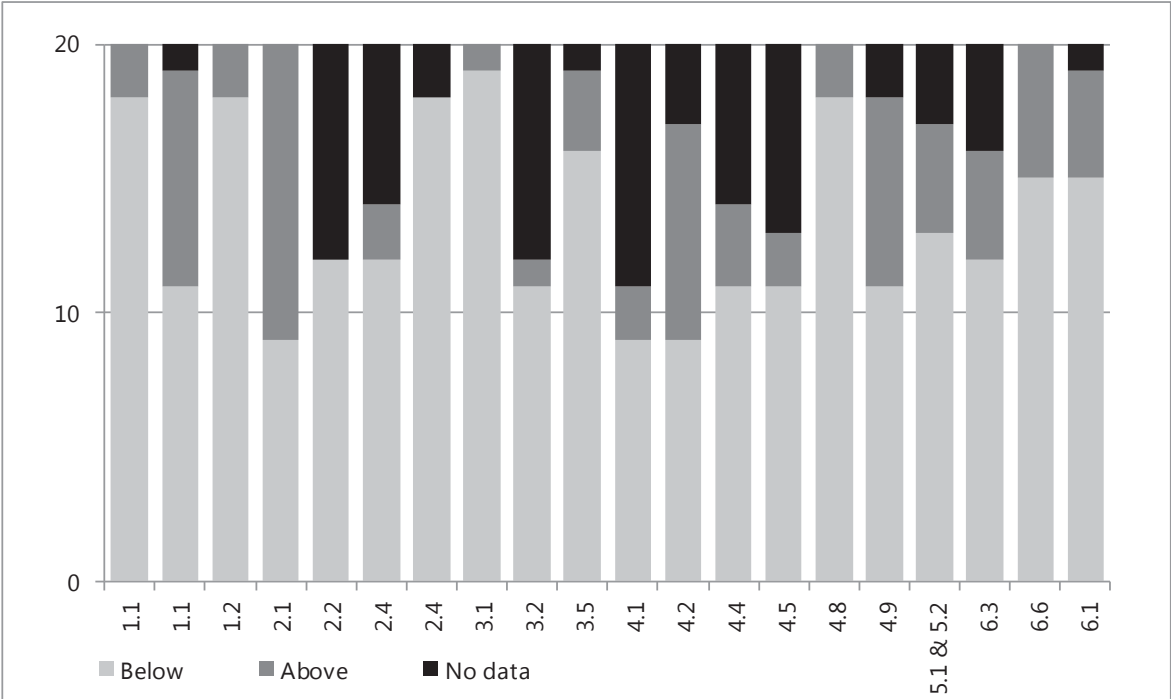


Table 5.1 Data availability and information on threshold by indicator

Indicator	Assessment parameter	Unit	Threshold	Number of countries below/above threshold (total = 20)			
				Below	Above	No data	
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	18	2	0
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	11	8	1
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	18	2	0
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication	%	>80%	9	11	0
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	12	0	8
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	12	2	6
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	18	0	2
3.1	Increment and fellings	Ratio fellings/NAI on FAWS, most recent ten-year period	%	>100%	19	1	0
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha per year	<€10/ha per year	11	1	8
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	16	3	1
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period	Change in %	Any negative change	9	2	9
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period	Change in %	Any decrease	9	8	3
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period	Change in %	Any increase	11	3	6
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports	Change in m ³ /ha	Any decrease	11	2	7
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	18	2	0
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	11	7	2
5.1 and 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	13	4	3
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha per year	< €5/ha per year	12	4	4
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	15	5	0
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	15	4	1
TOTAL					268	71	61

4.2 Results by country

In this section, the data for each country participating in the pilot study are presented, along with a summary of the comments of the national correspondent referring to indicators where the thresholds were exceeded. The comments put the recorded data into the national context.

Standard tables with all the parameters, as well as the correspondent's comments in full, are presented in annex 2. This section summarises the situation of each country, starting with the context (quantitative and qualitative indicators), and then focusing on the assessment of sustainable forest management, and of the national circumstances influencing how the recorded data should be interpreted. Not all information is repeated in the text, as readers may find all relevant information in the annex.

The information on policies and institutions was not available for the first draft of this study and was therefore not available for comment by the national correspondents in the SEMAFOR context. It is taken from the reports on qualitative indicators submitted for State of Europe's Forests 2015 and available at <http://www.foresteurope.org/national-reports2015>. This information is officially validated, and is only used here to establish the context.

Bosnia and Herzegovina

Context

Bosnia and Herzegovina, formerly part of Yugoslavia, was admitted to the UN in 1992 and for some years after that was the theatre of war, as well as of continuing tension. For these reasons, its forest institutions are faced with major challenges, notably with regard to reliable information. The national correspondent draws attention to the need for estimation in his comments. Nevertheless, it is possible to identify the broad lines of the situation.

Bosnia and Herzegovina is a country in the Western Balkans with 2.12 million hectares (41%) of forest cover and 0.55 hectares of forest per inhabitant, the highest in the SEMAFOR study outside the Nordic countries. Growing stock levels are 185 m³/ha. 6% of forest is considered plantations, and nearly 80% of forest is publicly owned. Bosnia and Herzegovina is a net wood exporter. Wood accounts for nearly 4% of total primary energy supply, and energy for about a fifth of wood biomass removals. (Both these ratios may be underestimates)

Bosnia and Herzegovina did not submit a report on qualitative indicators in the context of the Pan-European reporting 2015.

Assessment of sustainable forest management

Data are not available for 12 of the twenty assessment parameters, including change in area of FAWS, C/N index, value of marketed roundwood, forest management plans, tree species composition, natural regeneration, invasive species, deadwood, forest protection, protective functions and accident rates.

In many areas, developments are better than the internationally agreed thresholds: growing stock per hectare is recorded as increasing. Fellings are estimated at 56% of net annual increment. 0.25% of the forest is damaged by fire. 1% of forest tree species are threatened.

All the forests are accessible for recreation, although it should be pointed out that 2.4% of the land area is contaminated by landmines, which must affect accessibility.

In three cases, recorded data exceed the agreed international thresholds:

- The total forest area has decreased.
- Net entrepreneurial revenue for forestry is only €0.34/ha/year.
- 81% of natural ecosystem area is at risk of eutrophication.

Bulgaria

Context

Bulgaria is a country in the south-east of the Balkans, with 3.82 million ha (35%) of forest cover and 0.53 hectares of forest for each inhabitant. 16% of the forest is "undisturbed by man", and nearly 20% is plantation. Introduced tree species account for 5.4% of the forest area. Growing stock is 222 m³ per hectare of forest available for wood supply. 88% of the forest is publicly owned. Forestry accounts for 0.29% of GDP, and the forestry labour force for 0.65% of the total labour force. Bulgaria is a net exporter of wood and forest products. 9% of the wood biomass removals are used for energy purposes.

As regards policies and institutions, Bulgaria has a national forest programme, prepared according to Forest Europe principles and starting in 2013. The forest law dates from 2011, most recently revised in 2014. There was a formal statement of forest policy in 2013, and there is a formal communication and outreach strategy. There are about 39.5 administrative and policy staff for per 1,000,000 hectares of forest.

Assessment of sustainable forest management

In many areas, developments are better than the internationally agreed thresholds: total forest area is expanding by nearly 0.5% per year, and growing stock by 2.7% per year. 4.6% of the forest area has damage, just below the agreed threshold of 5%. Fire damages about 0.5% of the forest area annually. 37% of the net annual increment is felled. Practically all forest is under a management plan. 3.9% of forest is strictly protected for conservation of biodiversity. Net entrepreneurial revenue is €55 per hectare. 94% of the forest area is accessible for recreation.

Information is missing for six assessment parameters: C/N index of soil condition, value of marketed roundwood, change in share of invasive species, volume of deadwood, number of threatened tree species and accident rate.

In six cases, recorded data exceed the agreed international thresholds:

- The area of forest available for wood supply fell by 1.4% per year. This is not due to overcutting, but to reclassification of forest, notably to protected categories.
- 91% of the forest is considered "at risk of eutrophication" according to the EEA study. The national forest service does not have information on the origin and interpretation of this result. See discussion of indicator 2.1 above.
- The share of multi-species tree stands fell by nearly 5%. This is attributed to replacement, through natural progression, of coniferous stands planted in the 1950s by non-coniferous, especially beech, which constitutes single species stands.

- The share of natural regeneration is falling, by nearly 12% in the most recent period. This is due to reclassification of poor quality natural forest stands to either high forest or coppice, not to changes on the ground.
- The area of forest "designated as having protective functions" fell by 82 hectares, as some forests were reclassified from "protective" to "protected" forest.
- No data are available in the national forest service on accident rates.

Croatia

Context

Croatia is a country in the Western Balkans, with 1.92 million hectares (34%) of forest cover and 0.45 hectares of forest for each inhabitant. 0.4% of the forest is "undisturbed by man" and 5.3% plantation. Introduced trees account for 3.4% of the forest area. Growing stock is 223 m³/ha. 72% of the forest is publicly owned, and almost all the privately owned forest is in holdings of less than 10 hectares. Forestry accounts for 0.5% of GDP. Croatia is a net exporter of forest products. In Croatia, 5% of total primary energy supply is from wood. 30% of wood biomass removals are used for energy.

As regards policies and institutions, Croatia has a formal National Forest Programme, finalised in 2003. The forest law dates from 2005, amended in 2014. There was a formal statement of forest policy in 2006, but there is no formal communication and outreach strategy. There are 49 administrative and policy staff for 1,000,000 hectares of forest. Public expenditure on research, education and training is €0.70/ha/year.

Assessment of sustainable forest management

In many areas, developments are better than the internationally agreed thresholds: forest area and growing stock are expanding. 4.8% of the forest is damaged, except by fire (just below the threshold of 5%) and 0.2% is damaged by fire. Fellings stand at 60% of net annual increment, all forests are under a formal management plan or equivalent. The share of natural regeneration is increasing. 4% of forest tree species are threatened. The area of forest designated as having protective functions is increasing. The accident rate is falling, and nearly all forests are accessible for recreation.

Information is missing for four assessment parameters: C/N index, value of marketed roundwood, deadwood, and net entrepreneurial revenue.

In five cases, recorded data exceed the agreed international thresholds:

- The area of forest available for wood supply is decreasing, but this is a result, not of deforestation, but of the increase of protected areas, which is expected to continue.
- The share of Croatian natural ecosystem areas at risk of eutrophication according to the EEA study is 100%. However, the correspondent points out that according to Croatian research, using forest sample plots (unfortunately only a partial sample), the level of compounds responsible for eutrophication is not that high. Most of the pollution is transboundary in nature, but the Croatian forest is quite resilient because of its natural structure. Croatia participates actively in international work in this area.

- There has been a small decrease in the share of multi-species stands, but this is due to administrative changes, by which some bigger heterogeneous stands have been divided into smaller, homogeneous stands.
- The share of invasive species has increased a little. This is due to trends for *Robinia pseudoacacia*, which is actively managed, and controlled through strict regulations.
- The share of strictly protected forest is 2.8%, but it has doubled over the past twenty five years, and is on track to reach the proposed minimum level of 3%.

Czech Republic

Context

The Czech Republic is in central Europe and has 2.67 million hectares (34%) of forest cover, and 0.25 hectares of forest for each inhabitant. 0.4% of the forest is considered undisturbed by man but no plantations are reported. 1% of forests are of introduced species. There is a relatively high level of growing stock, 292 m³/ha. Three quarters of the forest is publicly owned. Of the private forest 46% is in holdings less than 10 hectares. Forestry accounts for 0.6% of GDP, and 0.3% of the workforce. The Czech Republic is a net exporter of forest products. Over 4% of total primary energy supply comes from wood, and about 30% of woody biomass harvest is used for energy.

As regards policy and institutions, the Czech Republic has a formal National Forest Programme, completed in 2003, and a forest law passed in 1995, and amended most recently in 2014. There was a formal statement of forest policy in 2008, and there is a formal communication and outreach strategy.

Assessment of sustainable forest management

In many areas, developments are better than the internationally agreed thresholds: forest area is increasing, soil condition, as measured by the C/N index is satisfactory. Damage (except fire) affects 2.4% of the forest, and fire a negligible amount. Fellings are about 80% of net annual increment. All forests are under formal management plans or equivalent. The value of marketed roundwood is €386/ha/year and net entrepreneurial revenue €140/ha/year. The shares of multi-species stands and natural regeneration are increasing, while deadwood levels are stable. 5% of forest tree species are threatened, and 4.9% of forests are strictly protected. The area of forest designated as having protective functions is increasing, and the accident rate is falling. All the forest is accessible for recreation.

Information is available for all assessment parameters.

In three cases, recorded data exceed the agreed international thresholds:

- The area of forest available for wood supply seems to be decreasing slightly, although the data are not fully comparable over time. This trend, if it exists, would be due to an increase in the area of protected forest.
- Likewise the growing stock on FAWS is decreasing slightly, as part of the same trend.
- Deposition of air pollutants is considered a serious problem in the Czech Republic, and a national study confirms the EEA result that the area at risk of eutrophication is about 90%. The EU Nitrates Directive is one of the main tools for an appropriate response.

Denmark

Context

Denmark is a Nordic country, with 0.61 million hectares (14.4%) of forest cover, and 0.1 hectares of forest for each inhabitant. 5.6% of the forest is considered undisturbed by man, and 76% is plantations. Growing stock is just over 200 m³/ha. Nearly a quarter of the forest is publicly owned, and of the private forest, 37% is in holdings of under 10 hectares. Forestry accounts for 0.14% of GDP and 0.07% of the labour force. 45% of the forest is of introduced species. Denmark is a net importer of forest products. Wood accounts for 10% of total primary energy supply.

As regards policy and institutions, Denmark has a formal National Forest Programme, completed in 2014. The forest law was passed in 2004, and amended most recently in 2014. There was a formal statement of forest policy in 2002, but there is no formal communication and outreach strategy.

Assessment of sustainable forest management

In many areas, developments are better than the internationally agreed thresholds: The area of forest and forest available for wood supply are increasing, as is growing stock. Soil condition, as measured by the C/N ratio, is satisfactory. There is damage on 2.3% of forests and no fire damage. 82% of net annual increment is felled. The value of marketed roundwood is €237/ha/year, and net entrepreneurial revenue €490/ha/year. The share of multi-species stands and of natural regeneration is increasing, while the share of invasive species is falling. 17% of forest tree species are considered threatened. There is no change in the area of forest designated as having protective functions. The accident rate is stable, and all forest is accessible for recreation.

Information is available for all assessment parameters

In two cases, recorded data exceed the agreed international thresholds:

- According to the EEA study, 100% of natural ecosystem areas in Denmark are at risk of eutrophication. However, according to a Danish study, focused on forests alone, 5% of the forest area is receiving nitrogen deposition over the carrying capacity, 14% below and 81% around the carrying capacity. Eutrophication risk is highest at the forest edge. Because of the fragmented nature of Danish forests, about 1/3 are within 50 meters of the forest edge. Denmark is committed to reducing ammonia emissions by 24% by 2020.
- About 1.1% of Danish forests are strictly protected, below the agreed threshold of 3%. The underlying reason is historical: Danish forests reached a low point of 3-4% forest cover around 1820 and since then have increased by plantation. As a consequence, old growth forests with high nature value have a very limited area. However, a mapping of "high nature value forests" is being undertaken to form the basis for a more focused protection of the nature values in forests.

Finland

Context

Finland is a sparsely populated, country in northern Europe, with 22.22 million hectares (73%) of forest cover, the highest in Europe. There are over 4 hectares of forest for each inhabitant. 1% of the forest is considered "undisturbed by man", and about 30% plantations. Just under a third of forests are publicly owned. Because of the harsh climatic conditions growing stock per hectare is relatively low 108 m³/ha. Forestry and the forest sector play a major economic role in Finland: forestry accounts for nearly 2% of GDP and 0.9% of employment. Exports are very important for Finland, and over 20% of wood biomass is used for energy.

As regards policy and institutions, there is a formal National Forest Programme, completed in 1993. The forest law was passed in 1997 and most recently amended in 2013. There was a formal statement of forest policy in 2014, and there is a formal communication and outreach strategy. There are 5.4 administrative and policy staff per 1,000,000 hectares of forest. Total official transfer payments/subsidies are €9.75 per hectare of private forest, while payments from the public budget to the state forest organisation are €5 per hectare of public forest. Finland spends nearly €2 per hectare of forest on research, education and training.

Assessment of sustainable forest management

In many areas, developments are better than the internationally agreed thresholds: forest area is expanding, growing stock is increasing, damage affects 0.28% of forests, with negligible fire damage. Fellings are at nearly 80% of increment. 95% of forests are under a formal management plan or equivalent. The value of marketed roundwood is €97/ha/year, and net entrepreneurial revenue is €93/ha/year. 41% of the natural ecosystem area is at risk of eutrophication. The median value of the C/N index for soil quality is 1.31. Multi-species stands have increased by nearly 5%. No increase in invasive species is reported. 12% of forests are strictly protected for biodiversity conservation. It is known that 16% of forest tree species are threatened. All the forest is accessible for recreation.

In five cases, recorded data exceed the agreed international thresholds:

- The area of forest available for wood supply (FAWS) has decreased. However, this is the result of establishing new areas for the conservation of biodiversity. It is not a threat to wood supply at the national level as fellings are still 80% of increment on FAWS, even though locally, reduction of FAWS has caused a decrease in forest revenue. This trend is in accordance with policy objectives and not a cause for concern.
- The share of natural regeneration has fallen, but the correspondent considers this threshold is not meaningful or relevant to Finnish conditions as natural regeneration is not possible on all sites: natural regeneration of spruce has resulted in poor quality seedling stands. The decision as regards natural regeneration is up to each forest owner.
- A reduction in deadwood per hectare is reported but this result is considered surprising as new guidelines recommend leaving more deadwood, and this is required by certification systems. The trend is towards more deadwood in southern Finland: the opposite trend in northern Finland may be due to measurement problems.

- The area of forest designated as having protective functions has decreased, but this is because some areas have been reclassified as forests protected for biodiversity. In any case the protective functions are still maintained, also in the new classification.
- For trends in the accident rate, lack of information is considered a cause for concern: however in Finland, data on accidents are available, but not according to the definitions used by SEMAFOR and the Pan-European reporting process.

France

Context

France is a country in central-west Europe with forest cover of 16.99 million hectares (30%), and a very varied forest resource, but none "undisturbed by man". 11.6% of the forest is considered plantations. There is 0.26 hectares of forest for each inhabitant, and the forest sector accounts for a rather small part of the economy and employment. A quarter of the forest is publicly owned, and the private forest is split into very many small holdings. Nearly 10% of forest products consumed are imported. Over half biomass removals are used for energy.

As regards policy and institutions, France has a formal National Forest Programme finalised in 2006. The forest law was passed in 1827, with the most recent amendment in 2014. The most recent formal statement of forest policy was in 2006. There is a formal communication and outreach strategy. There are 24.4 administrative and policy staff per 1,000,000 hectares of forest. Payment from the French public budget to the state forest organisation was €48/ha/year of public forest (not counting income from the SFO) and expenditure for research, education and training nearly €1.60/ha/year of forest.

Assessment of sustainable forest management

In many areas, developments are better than the internationally agreed thresholds: Area of forest and forest available for wood supply is increasing steadily, as is growing stock. Fellings are less than half of net annual increment. The average value of marketed roundwood is €105/ha/year, and net revenue is about €63/ha/year. The share of multi-species stands is increasing, and fire damage affects about 0.1% of the country. Soil quality, as measured by the C/N ratio, is satisfactory. Under 4% of forest tree species are classified as threatened. The accident rate for forest workers is falling.

Information is missing for four assessment parameters: forest damage other than fire, natural regeneration, invasive species and deadwood.

In four cases, recorded data exceed the agreed international thresholds:

- More than 80% of the national territory is at risk of eutrophication, according to the EEA study.
- Only 45% of forest area is under a formal management plan. However in France all felling is subject to administrative approval and the area under formal management plans is increasing. If "equivalent" management plans had been taken into account (as they are in the title of the parameter), the picture would be "considerably different" according to the national correspondent.

- Only 0.6% of the forest area is strictly protected. However this depends on how the French protection classes are interpreted. In France, MCPFE class 1.3 ("conservation through active management") has a high degree of protection. If this were included the share strictly protected would rise to 21%.
- Only 25% of the forest (the public forest) is considered legally accessible for recreation, as there is no right of access to private forest land. However, in practice, most of these forests are accessible and used for recreation. The correspondent considered that accessibility is not an issue in France.

Germany

Context

Germany is a country in central Europe with 11.42 million hectares (33%) forest cover. Because of the large population, there is only 0.14 hectares of forest for each inhabitant. Forestry accounts for 0.11% of Germany's GDP, and the forestry labour force for 0.11% of total employment. No forest is considered "undisturbed by man" and there are no plantations as defined for the enquiry. 1.9% of trees are of introduced species. Just over half of the forest is publicly owned. There are high average levels of growing stock – 321 m³/ha. Germany imports and exports significant volumes of wood and forest products. More than half the wood biomass harvested is used for energy.

As regards policy and institutions, no information was supplied by Germany on the context indicators used for SEMAFOR, except for an indication that there is a formal communication and outreach strategy.

Assessment of sustainable forest management

In many areas, developments are better than the internationally agreed thresholds: area of forest and of forest available for wood supply (FAWS) is expanding, as is growing stock. Fellings are 78% of net annual increment on FAWS. The value of marketed roundwood is, on average €326/ha/year, and net entrepreneurial revenue is €116/ha/year. 54% of natural ecosystem area is at risk of eutrophication, and the C/N index median value is satisfactory. Two thirds of forests are under a formal management plan or equivalent. The share of natural regeneration is increasing, and there is no change in the share of invasive species. Nearly 9% of forest tree species are considered threatened. There is negligible fire damage. The area of forest designated as having protective functions has increased. The number of accidents has fallen. 95% of the forest area is accessible for recreation.

Information is missing for two assessment parameters: area with damage (except fire) and share of multi-species stands.

In two cases, recorded data exceed the agreed international thresholds:

- The level of deadwood is recorded as falling. However this observation is contrary to observed medium term trends and results from changes in inventory methods. The level of deadwood is considered high. The correspondent points out that deadwood levels will fluctuate, notably because of episodic windthrow, and that there are

programmes in place to increase deadwood, which can only have effects over the long term.

- It is reported that 1.9% of the forest area is strictly protected (MCPFE classes 1.1 and 1.2), lower than the agreed threshold of 3%. However the value is subject to research activities and inter-ministerial consultations. The survey threshold for protected areas is still being discussed.

Hungary

Context

Hungary is a country in central Europe, with 2.07 million hectares (22%) forest cover, and 0.2 hectares of forest for each inhabitant. No forest is undisturbed by man and 40% of forest is plantation. 42% of the forest consists of introduced species, mostly *Robinia*. 58% of the forest is publicly owned and of the private forest just under 10% is in holdings of less than 10 hectares. Forestry takes 0.23% of GDP and 0.43% of the workforce. Hungary imports nearly 15% of its wood consumption. 3.6% of total primary energy supply comes from wood.

As regards policy and institutions, Hungary has a formal National Forest Programme, completed in 2007. The forest law was passed in 2009, with a formal policy statement in 2004. There is no formal communication and outreach strategy. Administrative/policy staff were reported at nearly 236.8 per 1,000,000 hectares of forest, although this figure may include other categories of staff. Transfer payments stood at €63 per hectare of private forest and public budget payments to the state forest organisation at €112 per hectare of public forest. Expenditure on research, education and training was just over €5/ha/year.

Assessment of sustainable forest management

In many areas, developments are better than the internationally agreed thresholds: the area of forest and forest available for wood supply is increasing, as is growing stock. Soil condition, as measured by the C/N index is satisfactory. 0.06% of the forest is damaged by fire. Fellings are 80% of net annual increment, and net entrepreneurial revenue is €75/ha/year. All forests are under management plans. The share of multi-species stands and of natural regeneration is increasing. 17% of forest tree species are threatened. The accident rate is decreasing and 98% of the forest is accessible for recreation.

Information is missing for two assessment parameters: value of marketed roundwood, and deadwood.

In five cases, recorded data exceed the agreed international thresholds:

- According to the EEA study, 100% of the natural ecosystem area is at risk of eutrophication, but the correspondent considers, based on national monitoring of depositions, that this is not 100% relevant to Hungary.
- Forest damage, except fire, is reported at 8.1%. The correspondent states that forest damage has increased over the last 30 years, and that it varies a lot. He considers that the 5% threshold may need reconsideration.

- The share of invasive species is increasing. In Hungary, this refers to *Robinia pseudoacacia*, which is indeed invasive, but is widely cultivated in Hungary for its positive qualities. The correspondent considers that this situation is not a threat to sustainability.
- Only 0.6% of forest is strictly protected for biodiversity. The correspondent considers that other types of protection than MCPFE classes 1.1 and 1.2 should also be considered and notes that 25% is devoted to nature conservation. 40% of the forest is under NATURA 2000.
- The decrease in area of forest designated as having protective functions is due to reclassification as forest protected for biodiversity, and the sustainability functions are still guaranteed.

Ireland

Context

Ireland is a country in the west of Europe, with 0.75 million hectares (11%), of forest cover and 0.16 hectares of forest for each inhabitant. There is no forest undisturbed by man and 91% of the forests are plantations, with 45% of introduced species. The growing stock is 134 m³/ha. Just over half the forest is publicly owned, and 22% of the private forest is in holdings of less than 10 hectares. Forestry accounts for 0.12% of GDP and 0.13% of the labour force. Ireland is a net exporter of forest products. Wood accounts for just over 1% of total primary energy supply, and about 10% of woody biomass removals go to energy.

As regards policy and institutions, a formal National Forest Programme for Ireland was approved in 2014. The forest law was passed in 1946, but a new law was passed in 2014, and is being enacted now. There is no formal communication and outreach strategy. There are 110 administrative/policy staff per 1,000,000 hectares of forest. There are official transfer payments/subsidies of €335 per hectare of private forest, and a payment from the public budget to the state forest organisation of €9 per hectare of public forests.

Assessment of sustainable forest management

In many areas, developments are better than the internationally agreed thresholds: area of forest and area of forest available for wood supply (FAWS) are expanding, as is growing stock on FAWS. Fellings account for 52% of net annual increment. Soil condition, as measured by the C/N index is satisfactory. Fire damage is insignificant. 72% of forests are under a management plan. To the knowledge of the correspondent, there are no invasive species. The volume of deadwood is increasing. The accident rate is falling.

Information is missing for six assessment parameters: forest damage, except by fire, value of marketed roundwood, multi-species stands, strictly protected area, forest designated as having protected functions, net entrepreneurial revenue.

In four cases, recorded data exceed the agreed international thresholds:

- Although the EEA study recorded 81% of Ireland's forest as at risk of eutrophication, the correspondent does not consider that forests are affected by eutrophication in Ireland.
- The data showing a decline in the share of natural regeneration are derived from a plot classification in the national forest inventory which may be "a little subjective". The correspondent considers there are no underlying issues in this respect.

- There was no information on the share of threatened forest tree species, but the correspondent estimated there is only one threatened (“vulnerable”) tree species in Ireland. As the total number of forest tree species is not known precisely, the share of threatened species cannot be calculated, but is low.
- The recorded share of forest accessible for recreation, 56%, refers essentially to publicly owned forest, as the private forests are generally not open to the public. The share of forest accessible for recreation is falling as the area of public forest is stable while that of private forest is increasing. However, the Irish people have not seen any reduction in the areas open to recreation. Indeed there has been significant investment in this area by the Exchequer and the public forest company.

Latvia

Context

Latvia is a Baltic country with 3.36 million hectares (54%) of forest cover, and 1.7 hectares of forest for every inhabitant. 0.5% of the forest is considered undisturbed by man and 0.3% plantations, with 0.1% of introduced species. The average growing stock per hectare is 195 m³. 52% of the forest is publicly owned, and of the private forest, a quarter is in holdings under 10 hectares. Forestry accounts for 3.3% of GDP and nearly 2% of the labour force. Latvia is a net exporter of forest products. 26% of the country’s total primary energy supply comes from wood.

As regards policy and institutions, a formal National Forest Programme was approved in 2006. The forest law was passed in 2000 and amended most recently in 2011. The most recent formal statement of forest policy was in 1998. There is no formal communication and outreach strategy. Administrative/policy staff were reported at nearly 211.3 per 1,000,000 hectares of forest, although this figure may include other categories of staff.

Assessment of sustainable forest management

In many areas, developments are better than the internationally agreed thresholds: the area of forest and of forest available for wood supply is increasing, as is growing stock on FAWS. Fellings are 76% of net annual increment. Soil condition, as measured by the C/N index is satisfactory. 0.26% of the forest shows damage, and there is insignificant fire damage. 89% of the forest is under a management plan. The value of marketed roundwood is €144/ha/year and net entrepreneurial revenue €48/ha/year. The share of natural regeneration is increasing. There is no change in invasive species. The volume of deadwood per hectare is increasing. 12% of forest tree species are threatened. 5.8% of forests are strictly protected. The area of forest designated as having protective functions is increasing. The accident rate is falling. 93% of forests are accessible for recreation.

Information is missing for one assessment parameter, share of multi-species stands.

In one case, recorded data exceed the agreed international thresholds:

- According to the EEA study, 99% of forests in Latvia are at risk of eutrophication. The national correspondent was not able to explain this result.

Lithuania**Context**

Lithuania is a Baltic country with 2.18 million hectares (35%) of forest cover, and 0.74 hectares of forest per inhabitant. 1.2% of forest is considered undisturbed by man, and no plantations are reported, with 0.1% of introduced species. The average growing stock per hectare is 222 m³. 61% of forest is publicly owned, and of the private forest 62% is in holdings of less than 10 hectares. Forestry contributes 0.5% of GDP and accounts for 0.7% of the workforce. Lithuania is a net exporter of wood and forest products. 12.5% of total primary energy supply in Lithuania comes from wood, and 32% of woody biomass removals are used for energy.

As regards policy and institutions, Lithuania did not submit a report on qualitative indicators in the context of the Pan-European reporting 2015.

Assessment of sustainable forest management

In many areas, developments are better than the internationally agreed thresholds: area of forest and forest available for wood supply (FAWS) are increasing as is growing stock. Fellings are 83% of net annual increment. Soil condition, as measured by the C/N index, is satisfactory. Forest damage, except fire, at 4.4% is below the 5% threshold, while fire damage is insignificant. All the forest is under a management plan. The value of marketed roundwood is on average €136/ha/year, and net entrepreneurial revenue is €43/ha/year. The share of stands with 6 or more species increased between 2000 and 2010. There is no change in deadwood, or in invasive species. No threatened forest tree species are reported. 5.1% of forests are strictly protected. The area of forest designated as having protective functions has increased. The accident rate has fallen. 99% of the forest is accessible for recreation.

Information is missing for one assessment parameter, share of multi-species stands, although a figure was provided for stands with 6 species or more.

In two cases, recorded data exceed the agreed international thresholds:

- According to the EEA study, 100% of forests in Lithuania are at risk of eutrophication, but the correspondent considers this study is not representative of the situation in Lithuania; the health and vitality of Lithuanian forests are generally considered satisfactory.
- There is uncertainty about the definition of the indicator on natural regeneration, which, it is pointed out, is strongly influenced by national circumstances. In Lithuania, the use of planting is considered to accelerate stand establishment and thus reduce the time without tree cover after harvesting.

Norway**Context**

Norway is a Nordic country with 12.11 million hectares (40%) of forest cover, and 2.4 hectares of forest for each inhabitant. On average, growing stock is 125 m³/ha, 1.3% of forest is

considered undisturbed by man and 1% is plantation. 0.5% of forests consists of introduced species. 12% of forest is publicly owned, and of the private forest area, 2.5% is in holdings of less than 10 hectares. In Norway, forestry contributes 0.22% of GDP and accounts for 0.15% of the workforce. Norway is a net exporter of forest products. 4.2% of total primary energy supply comes from wood and about a quarter of woody biomass removals go to energy.

As regards policy and institutions, Norway has a National Forest Programme approved in 1998. It is guided by the MCPFE principles for NFPs. The forest law was passed in 2006, and amended most recently in 2014. There is no formal communication and outreach strategy. There are official transfer payments/subsidies of just over €4 per hectare of private forest, and payments from the public budget to the state forest organisation of €28 per hectare of public forest.

Assessment of sustainable forest management

In many areas, developments are better than the internationally agreed thresholds: forest area is increasing, as is growing stock. Fellings are 46% of net annual increment. 14% of natural ecosystem area is at risk of eutrophication. Soil condition, as measured by the C/N index is satisfactory. The value of marketed roundwood is on average €53/ha/year. There is no change for invasive species and deadwood is increasing. No threatened forest tree species are reported. 3.5% of forest area is strictly protected for biodiversity, and there is no change in the area of forest designated as having protective functions. The accident rate is falling, and all forests are accessible for recreation.

Information is missing for four assessment parameters: C/N index for soil condition, area of damage, and area of fire damage, share of multi-species stands.

In four cases, recorded data exceed the agreed international thresholds:

- The area of forest available for wood supply is falling slightly, mainly due to increased protection of forests, although expansion of settlements and infrastructure may have also contributed.
- Only 28% of forest area is recorded as having a management plan. However, it is not mandatory for forest owners to have such a plan: as stated by the national correspondent, there are many small forests and they may be well managed without a plan. The area with significance for wood production is quite low in Norway, about 6.0-6.5 million ha. Furthermore, the figure supplied covers only areas assessed after the introduction of a new planning system in 2001: plans prepared before 2001 may still be in use today (but would not have been included in the data provided)..
- The share of natural regeneration has fallen. Planting activities have been increasing since 2005, with the support of the authorities, in order to secure sufficient regeneration after planting.
- Net entrepreneurial revenue was negative in the most recent period, when timber harvest and prices were low compared to other periods.

Romania

Context

Romania is a country on the Black Sea, with 6.86 million hectares (29%) forest cover, and 0.35 hectares of forest for each inhabitant. There are nearly 280 m³/ha of growing stock. Just over 4% of forest is considered "undisturbed by man", and 8.3% plantation. The share of introduced species is 6.3%. Two thirds of the forest (67%) is publicly owned. Forestry accounts for 0.4% of GDP. Government expenditure for services is €5 per hectare of forest. Forestry accounts for 0.58% of the total work force. Consumption of wood products is just under 0.7 m³ per head, and Romania is a net exporter of wood and forest products. Wood accounts for just over 10% of total primary energy supply.

As regards policy and institutions, Romania has a national forest programme for the period 2014-2023, and the forest law was enacted in 2015. There is a formal communication strategy. Official transfer payments to private forest owners are €0.23 per hectare of private forest, and public expenditure on research, education and training for forestry is €0.47 per hectare of forest. There are about 62 administrative and policy staff for per 1,000,000 hectares of forest.

Assessment of sustainable forest management

In many areas, developments are better than the internationally agreed thresholds: forest area is expanding by 0.71% per year, and growing stock on forest available for wood supply by 1.93% per year. 20% of natural ecosystem areas are at risk of eutrophication. 0.02% of the forest is damaged by fire. Fellings account for nearly 55% of net annual increment. 84% of forests are under a management plan. The share of natural regeneration shows a slight increase. 3.4% of the forest area is strictly protected for the conservation of biodiversity, and the area designated as having protective functions is increasing. Net entrepreneurial revenue per hectare of forest is over €18 per hectare. The accident rate has fallen slightly.

Information is missing for seven assessment parameters: soil condition (C/N ratio), value of marketed roundwood, share of multi-species stands, developments for invasive species and for deadwood, number of threatened forest tree species and area accessible for recreation.

In three cases, recorded data exceed the agreed international thresholds:

- The area of forest available for wood supply appeared to be in decline, but this may be the consequence of estimation methods, as revised estimates show an increase. The data situation will be improved.
- The very large increase recorded for forest damage (to 22%, far higher than in any other country), is due to a changed methodology put in place by the national forest inventory. The NFI is looking into the situation.
- At present, there is no information on the number of threatened forest tree species. The national forest inventory will supply this information for future enquiries.

Serbia

Context

Serbia is a country in the central Balkans, with 2.72 million hectares of forest cover (31%) and 0.38 hectares of forest for each inhabitant. There is 154 m³ of growing stock per hectare on average. Less than 0.1% of forest is "undisturbed by man" and 7.9% is plantation. Introduced species account for 0.1% of forest and other wooded land. Just over half of forest is publicly owned, while nearly all private forest is in holdings of less than 10 hectares. The forest sector accounts for 0.3% of the total labour force. Wood consumption is about 1.4 m³ roundwood equivalent per inhabitant, and net imports are equivalent to about 17% of consumption. Wood accounts for 14% of total primary energy supply, and nearly 80% of total wood biomass removals are used for energy.

As regards policy and institutions, the forest law was enacted in 2010 with the most recent revision in 2012. There is a national forest programme, implemented since 2011. The most recent formal statement of forest policy was in 2006. There are about 22 administrative and policy staff for per 1,000,000 hectares of forest.

Assessment of sustainable forest management

In many areas, developments are better than the internationally agreed thresholds: the area of forest and other wooded land, and of forest available for wood supply are expanding, by nearly 1% per year, and growing stock is also expanding by more than 3% per year. Just under 3% of the forest area has damage, with 0.03% damaged by fire. Fellings are just over half of net annual increment. 83% of forest and other wooded land is under a management plan. The volume of deadwood is increasing by about 0.3 m³/ha every year. 4.8% of forests are protected for biodiversity conservation. The area designated as having protective functions is also increasing. All the forest is accessible for recreation.

Information is missing for 5 assessment parameters: soil condition (C/N ratio), share of multi-species stands, number of threatened forest tree species, net entrepreneurial revenue and accident rates of forest workers.

In five cases, recorded data exceed the agreed international thresholds. The national correspondent was not able to provide information putting these into context, or describing the policy response, so these must not be taken as evidence that there is a cause for concern or a threat to sustainability of forest management.

- 95% of the natural ecosystem area is considered at risk of eutrophication by the EEA study
- The value of marketed roundwood is €0.17 per hectare, which is below the threshold of €10 per hectare.
- The share of natural regeneration in total regeneration has fallen, although it appears that this is due to reclassification as coppice of certain low productivity stands.
- There are no data on number of threatened forest tree species.
- There are no data on accident rates for forest workers.

Slovakia

Context

Slovakia is a central European country with 1.94 million hectares (40%) of forest cover and 0.4 hectares of forest for each inhabitant. It has quite high levels of growing stock: 246 m³/ha, 1.2% of the forest are considered undisturbed by man and 1% plantations, with 2.9% of introduced species. Half the forests are publicly owned. Forestry contributes 0.33% of GDP, and accounts for 0.8% of the workforce. Slovakia is a net exporter of wood and forest products. Nearly 5% of total primary energy supply comes from wood and 14% of woody biomass removals go to energy.

As regards policy and institutions, Slovakia has a formal National Forest Programme adopted in 2006. The forest law was passed in 2005, and amended most recently in 2014. The most recent formal statement of forest policy was in 2007. There is no formal communication and outreach strategy. There are 113 administrative/policy staff per 1,000,000 hectares of forest. Official transfer payments/subsidies are about €20 per hectare of private forest, and payments from the public budget to the state forest organisation were about €16 per hectare of public forest. Just over €1 per hectare of forest was spent on research, education and training.

Assessment of sustainable forest management

In many areas, developments are better than the internationally agreed thresholds: the area of forest and forest available for wood supply is increasing, as is growing stock, notably because fellings are 67% of net annual increment. Soil condition, as measured by the C/N index, is satisfactory. 1.45% of the forest has damage (except fire) and fire damage is very small. The average value of marketed roundwood is €180/ha/year and net entrepreneurial revenue €28/ha/year. All the forest is under a management plan. The share of multi-species stands is increasing, as is the share of natural regeneration. 12% of forest tree species are threatened. 3.7% of forests are strictly protected, and the area designated as having protective functions has increased. The accident rate has fallen, and 94% of the forest is accessible for recreation.

Information is missing for one assessment parameter, change in deadwood.

In two cases, recorded data exceed the agreed international thresholds:

- According to the EEA study, 100% of Slovakia's natural ecosystem area is at risk of eutrophication. However the correspondent considers that plot level data shows more positive results and that the status of deposition of air pollutants in Slovakia, while worse than in Scandinavia, is better than in most countries of central and western Europe.
- The increase in the share of invasive species is explained by a small expansion of *Robinia pseudoacacia*, which can be explained by extreme climate (drought) and the lower intensity of silvicultural interventions and weak control of invasive species. Following the EU Regulation on invasive alien species, national policies and programmes are under development.

Sweden

Context

Sweden is a country in northern Europe, with 28.01 million hectares (68%) of forest cover, and 2.9 hectares of forest per inhabitant. Growing stock per hectare is relatively low, 120 m³/ha, because of the harsh climatic conditions. Nearly 9% of forests are considered "undisturbed by man" and 2.5% "plantations". 1.7% of the forest is dominated by introduced species. A quarter of the forest is publicly owned, and 2% of private forest holdings are less than 10 hectares. The forest sector is economically important in Sweden: forestry (without forest industry) accounts for 1.2% of GDP and 0.6% of the workforce. Sweden is a major exporter of forest products. Wood accounts for a fifth of Sweden's total primary energy supply, and energy accounts for 23% of wood biomass removals.

As regards policy and institutions, Sweden has a formal National Forest Programme, approved in 2014. The forest law was passed in 1979, and amended most recently in 2014. The most recent formal statement of forest policy was in 2008. There are just over 52 administrative/policy staff per 1,000,000 hectares of forest. There is a formal communication and outreach strategy. There are transfer payments/subsidies of nearly €5.50 per hectare of private forest. About €2.30 per hectare of forest was spent on research, education and training.

Assessment of sustainable forest management

In many areas, developments are better than the internationally agreed thresholds: soil condition as measured by the C/N index is satisfactory, and 47% of natural ecosystem areas are at risk of eutrophication. 4.3% of forests show damage, with negligible fire damage. The value of marketed roundwood is €143/ha/year and net entrepreneurial revenue €52.50/ha/year. 96% of forests are under formal management plans or equivalent. There has been an increase in multi-species stands and no change for invasive species. 6.6% of the forests are strictly protected. 23% of forest tree species are considered threatened. There is an increase in the area of forest designated as having protective functions. The accident rate for forest workers has fallen. All forests are accessible for recreation.

Information is available for all assessment parameters.

In six cases, recorded data exceed the agreed international thresholds:

- There may have been a small loss of forest area over the last ten years, although the change may not be statistically significant. In a policy context, Sweden is a country dominated by forest and a small loss of forest area is not considered a threat to sustainability of forest management or of Swedish society as a whole.
- There has been a decline in the area of forest available for wood supply, as government policy has been to increase protected forest area, to secure biodiversity, cultural and social values of the forest. This has led to a decline in the area of FAWS. Therefore the decrease in the area of FAWS is not seen as a threat to sustainability but as a prerequisite for it. The area of FAWS is expected to decline further in future.

- For the same reasons, growing stock on FAWS declined, so the above considerations also apply to growing stock.
- The ratio between fellings and net annual increment was 110% over the past ten year period. This is attributed to two large storms, necessitating high sanitary fellings, and strong demand for forest products. There is also a technical aspect, magnified by circumstances: the ratio agreed for this study counts fellings of natural losses (e.g. from windthrow) in the numerator, but not in the denominator (net annual increment does not include natural losses), as many countries cannot identify separately fellings of natural losses. In cases like Sweden, with high natural losses in the period, the ratio can be misleading. However in Sweden the sustainable harvest level is not defined by a simple ratio, but on the basis of detailed national outlook studies, which justify a level of felling higher than net annual increment, because of various silvicultural improvements.
- The data show a decrease in the share of natural regeneration. Despite measurement problems, this is probably the best approximation possible, and certainly reflects a real trend. Natural regeneration now accounts for about 20% of regeneration. This share has been falling, as the risk of poor regeneration results on the remaining area is considered too high, and the obligation to ensure acceptable regeneration after harvesting is a foundation of Swedish forest policy. Moose browsing is also more problematic in naturally regenerated stands. Overall, in Swedish conditions, a decrease in the area of forest originating from natural expansion or regeneration is not seen as a threat to sustainability.

Switzerland

Context

Switzerland is a mountainous country in central Europe with 1.25 million hectares (31%) of forest cover, and 0.15 hectares of forest for each inhabitant. Just over 3% of Swiss forests are considered undisturbed by man, and only 0.1% plantations. Introduced species account for only 0.5% of the forest area. There are very high levels of growing stock: 352 m³/ha. Two thirds of forests are publicly owned, and 22% of the private forests are in holdings under 10 hectares. Forestry accounts for an insignificant part of the national economy, and less than 0.2% of the labour force. About 5% of roundwood consumed in Switzerland are imported. A large part of woody biomass removals are used for energy, which accounts for 4.2% of national energy supply.

As regards policy and institutions, Switzerland has a formal National Forest Programme adopted in 2002. The current forest law entered into force in 1993, with the most recent amendment in 2013. The most recent formal statement of forest policy was in 2011. There is no formal communication and outreach strategy. There are 287 administrative/policy staff per 1,000,000 hectares of forest, although this figure may include some other employment categories. There were official transfer payments/subsidies of about €165 per hectare of private forest.

Assessment of sustainable forest management

In many areas, developments are better than the internationally agreed thresholds: Area of forest and forest available for wood supply is increasing steadily, as is growing stock. Fellings are nearly 90% of net annual increment. 74% of natural ecosystem area is at risk of eutrophication, just below the threshold of 80%. 0.89% of the forest suffers damage, excluding fire, and fire damage is insignificant. Over 80% of the forest area is under a formal management plan or equivalent. The share of multi-species stands is increasing, as is the level of deadwood. 6.5% of the forest tree species are considered threatened. The area designated as having protective functions is increasing slightly. The accident rate is falling. All the forest area is considered accessible for recreation.

Information is missing for two assessment parameters: C/N index and average value of marketed roundwood.

In three cases, recorded data exceed the agreed international thresholds:

- The share of natural regeneration fell by 1.05 percentage points. The correspondent noted that the statistical error of estimate is bigger than this change. He also considered the indicator inappropriate, as natural regeneration may be inappropriate in several circumstances.
- The area of strictly protected forest is 2.5%, less than the threshold of 3%. However, Switzerland is on track to its target of 5% by 2030.
- Net entrepreneurial revenue in Switzerland is negative (-€79/ha/year in the most recent period). The correspondent noted that there are several reasons for this, structural (small forest holdings), economic (high costs, high value of the Swiss franc) and political (ecosystem services only partly compensated). Policy measures are being taken to address this issue.

Ukraine

Context

Ukraine is a country in eastern Europe, with 9.66 million hectares (17%) of forest cover, and 0.2 hectares of forest for each inhabitant. Forestry accounts for 0.26% of GDP, and the forestry workforce for 0.3% of employment. 92% of the forest is publicly owned, and all the rest is in holdings of less than 10 hectares. 0.6% of the forest is considered undisturbed by man, and just under 4% plantations. Nearly 4% of forest is of introduced species. Ukraine is a net exporter of wood and forest products. Wood accounts for just over 1% of total primary energy supply.

As regards policy and institutions, Ukraine has a formal National Forest Programme adopted in 2010. The forest laws were passed in 1994 and 2006, with most recent amendments in 2014. The most recent formal statement of forest policy was in 2010. There is no formal communication and outreach strategy. There are about 75 administrative/policy staff per 1,000,000 ha of forest.

Assessment of sustainable forest management

In many areas, developments are better than the internationally agreed thresholds: forest area and growing stock are expanding and fellings account for less than a quarter of net annual increment. All the forest is under formal management plans or equivalent. The share of multi-species stands is increasing slightly, and there is no change in the share of natural regeneration. There is an increase in deadwood. 5.4% of the forest is strictly protected for the conservation of biodiversity. The accident rate for forest workers has fallen.

Information is missing for four assessment parameters: Soil condition, as measured by the C/N index, value of marketed roundwood, share of threatened forest tree species¹⁷, net entrepreneurial revenue.

In five cases, recorded data exceed the agreed international thresholds:

- The area of forest available for wood supply is recorded as falling, but this category is not clearly defined in Ukraine, so estimation was necessary. Furthermore, this decline reflects an increase in areas with environmental restrictions.
- The statement from the EEA study that all the natural ecosystem area in Ukraine is at risk of eutrophication is not considered acceptable by the correspondent as, according to expert opinion, there is no significant problem with eutrophication.
- There is a very small increase in the share of invasive species, from 0.27% to 0.28%, an increase of 1,000 hectares, which may be considered not significant from the policy point of view.
- A slight decrease in area of forest designated as having protective functions, but the data are not fully comparable over time. According to expert opinion, this is not considered an area of concern.
- The figure provided for area accessible for recreation (76%, just under the threshold of 80%) in fact covers all forests suitable for recreation, or where recreation is possible without any limitation. According to Ukrainian legislation, citizens have access to practically all forests.

United Kingdom

Context

The UK is a highly urbanised country with 3.14 million hectares (13%) of forest cover, and 0.05 hectares of forest per inhabitant. 89% of the forests are plantations and no forests are "undisturbed by man". Forestry accounts for 0.03% of GDP and for 0.07% of the labour force. Growing stock is 207 m³/ha. Just over a quarter of the forests are publicly owned and 28% of private holdings are of less than 10 hectares. Government expenditure per hectare of forest is €65/ha/year. About 60% of forest products consumption is imported. Wood accounts for just over 1% of total primary bioenergy supply.

As regards policy and institutions, the UK has a national forest programme, similar to the MCPFE concepts, adopted in 2003. The forest laws were passed in 1967 and 2010. The most

¹⁷ Data were supplied on threatened species, but not on total tree species, making it impossible to calculate a ratio.

recent formal statement of forest policy was in 2011. Official transfer payments/subsidies are nearly €50 per hectare of private forest, and payment from the public budget to the state forest organisation nearly €80 per hectare of public forest. Public expenditure on research, education and training was about €4.60 per hectare of forest.

Assessment of sustainable forest management

In many areas, developments are better than the internationally agreed thresholds: the area of forest and of forest available for wood supply is expanding, as is growing stock. Fellings are just under half of increment. 19% of natural ecosystem area is at risk of eutrophication. Soil quality, as measured by the C/N index is satisfactory. The value of marketed roundwood is €132/ha/year. Deadwood and forest designated as having protective functions are stable.

Information is missing for six assessment parameters: Forest damage (fire and other), share of multi-species stands, and natural regeneration, trends for invasive species, number of threatened species.

In five cases, recorded data exceed the agreed international thresholds:

- Just under 50% (the threshold) of forests were under long term management plans or equivalent. Some of this is estimated, and there are in any case strict controls on deforestation. Plans are also required as a condition for some funding, so the percentage is expected to rise. In any case, it cannot be assumed that the remaining 50% without formal management plans are at risk.
- It is estimated that 1.4% of UK forests are strictly protected, but this based on an estimate of the share of class 1.2 in a total for 1.2+1.3. In any case, a country like the UK with a long history of management would be expected to have more forests in protection class 1.3 (conservation through active management).
- The reported net entrepreneurial revenue is quite strongly negative (-€49.80/ha/year), but there are concerns about the reliability of some estimates, although costs are high in the UK. Further investigation of this aspect is under way.
- The rise in the accident rate reported is very small, is unlikely to be statistically significant and is contrary to the long term downward trend (1990-2010). The UK attaches great importance to safety, health and welfare and has policy instruments and institutions in place.

The area reported as "accessible for recreation" – 45%, with a threshold at 85% - is for permissive access only, as recorded on a database, and is a significant underestimate: inclusion of woodland in Scotland (where there is "right to roam" legislation) would increase it to 65%, and including rights of way in forests would also increase it.

5 Discussion

This is a pilot study for a general concept. What are the questions raised and the lessons learned from the experience? This section discusses some of the most challenging issues in the light of the experience gained during the pilot study. As the pilot study is only a part of a longer process, this section also raises some issues for future discussion. It does not address the issues connected to particular indicators, as they have been briefly discussed in the "results" section.

This section, like the rest of the Discussion Paper, represents the opinion of the author only, not that of UNECE/FAO Forestry and Timber Section, nor of the Committee on Forests and the Forest Industry, the European Forestry Commission, the UNECE/FAO Joint Working Party on Forest Statistics, Economics and Management or the Team of Specialists.

5.1 Feasibility of the SEMAFOR approach to assessment

The purpose of a pilot study is to test the feasibility of the method under consideration. What is the outcome for the SEMAFOR approach? On the basis of experience with the 20 countries who participated in the pilot study and which between them account for more than half of Europe's forests, it can be said that it has been possible to collect and analyse accurate and meaningful information on the vast majority of the parameters chosen. Data are available for about 85% of the indicators. Taken together, these data provide a comprehensive description of the state of sustainable forest management in the participating countries. As the underlying data are collected through an ongoing formal international process, it is likely that this will also be true in the future, so the SEMAFOR approach could be applied, without excessive expense, if it were decided to move beyond the pilot phase and apply the method to all the countries in the region. The data to be analysed will be already checked for conformity with international definitions, and there will be no extra reporting burden.

Furthermore, experience of dialogue with national correspondents has been extremely positive. Their responses to questions about parameters for which thresholds were exceeded, improved information, provided context and identified policy responses when this was necessary. The tables and summaries in this paper provide a succinct overview of the sustainability of forest management in European countries, based on internationally comparable data.

After these dialogues, it appeared that, in almost all cases, the parameters measured did not exceed the thresholds, or, if they did, national circumstances explained and justified this situation. Does this imply that forest management is completely sustainable in all the countries in the pilot study? The answer to this question depends chiefly on the extent to which the thresholds applied are accepted as truly indicative of sustainability of forest management. This central aspect of the thresholds is explored below.

5.2 Desirability of common thresholds

Given the wide differences in circumstances and values between countries, even in a relatively homogeneous continent like Europe, is it meaningful or useful to have common international thresholds for assessment parameters¹⁸?

Arguments ***in favour of common thresholds*** are:

- Common thresholds much increase the credibility and impact of the whole exercise (allowing countries to set their own thresholds would give the impression of different standards across the continent, and of setting the thresholds at levels which are easily achievable).
- Common thresholds increase transparency and clarity.
- Common thresholds make it possible to make statements about sustainability at the regional, not only national, level, thereby facilitating regional reporting on international goals and targets.
- Without common thresholds, there is a risk that a confusing patchwork system of non-comparable results emerges.
- Common thresholds would be one way of setting and monitoring ambitious targets for regional forest policy instruments, such as the proposed legally binding agreement (LBA), even if these targets are voluntary.
- Common thresholds make it more difficult to minimise or conceal inconvenient areas of concern.
- Common thresholds make it clear that some changes are areas of concern in all circumstances (absolute concerns). Examples would be major unplanned deforestation, or significant loss of biodiversity.
- Internationally agreed thresholds make it easier to define performance standards in countries where their development through purely national processes might be difficult or impossible.
- Without common thresholds, the "assessment" process becomes essentially descriptive, and does not really assess progress towards sustainable forest management, especially if countries propose national thresholds which are very similar to existing national practice.
- More severe national thresholds can be developed by countries to set more ambitious goals, if the common thresholds are considered not sufficiently ambitious.

Arguments ***against common thresholds*** are:

- National circumstances are so different that a common approach cannot take them properly into account. The risk is high of condemning what is, in fact, acceptable, or tolerating what is not sustainable.

¹⁸ The concept of thresholds is not used for the context parameters, which thus become tools for description, not assessment.

- Trying to set common thresholds which are acceptable to all leads to a “lowest common denominator” approach, whereby the thresholds are set too low, at levels which are not ambitious enough.
- In addition, common thresholds have often been formulated in a general way (e.g. “any negative change”): having them agreed nationally would have made them more specific.
- Common thresholds agreed in international fora, even when the discussion is in a non-legally binding context, infringe on national sovereignty to decide what is acceptable or not.
- Often national forest policy consists of finding the right balance for sustainable forest management between objectives which sometimes conflict. Setting common thresholds on an indicator-by-indicator basis makes it difficult to incorporate this country-specific trade-off process into the thresholds.
- Nationally agreed thresholds can be incorporated into national legislation, policies, guidelines and other policy tools more easily than international thresholds.

Experience with the SEMAFOR process showed that the most interesting and intense dialogue with national correspondents occurred when they were challenged by data which showed their country had exceeded the common thresholds. The correspondents were then stimulated to consider in what way their national circumstances were sustainable, and how this could be demonstrated objectively, in an international context. As a consequence, they provided new data, valuable background information and more detailed analysis of data quality and comparability problems, which, in many cases, showed that, in those particular national circumstances, it was possible to exceed the common thresholds without endangering sustainability. Thus, the common thresholds played a vital role in the process of analysing sustainability.

Thus, the existence of the thresholds provided a major stimulus, not only to the supply of data, but, more important, to reflection on what the real significance of those data is.

5.3 Values of the thresholds

Another question concerns the values of the thresholds. Faced with the difficulty of determining a sustainable level, it has often been necessary to make a rather arbitrary choice. Very often, these levels are not very challenging, precisely because they are arbitrary, as the SEMAFOR team did not want to impose demanding thresholds without an in-depth process of international discussion. The pilot study could thus focus on the feasibility and the method. Although countries had the opportunity to comment on the thresholds at the beginning of the process, few did so, presumably because it is a “pilot study” and the results have no formal weight. If the SEMAFOR approach were to be applied officially, in whatever context, it would be necessary to have a formal and detailed discussion of all the parameters and all the thresholds.

There is also a built-in bias towards the *status quo*: considering that the present level of an indicator, whatever it is, is sustainable. In particular, in many cases the threshold is defined as

“any negative change”, “any decrease” or “any increase”¹⁹. This has the merit of defining which direction of change is desirable or undesirable, but makes the implicit assumption that the present level is acceptable. If, in a given country, an indicator is stable, but at an unsustainable level, the SEMAFOR thresholds would often not detect this. This bias towards the *status quo* should be kept in mind in any review of the values of the thresholds.

5.4 Alternatives to common thresholds?

Given the disadvantages of the approach through common international thresholds, are there other approaches to maintaining transparency, objectivity and credibility, while taking account of differing national circumstances? Is it possible to devise a mixed system? One approach would be to base the sustainability assessment on thresholds fixed by the countries themselves, in a transparent and formal process. Countries might be asked to define their own thresholds, using the parameters identified by SEMAFOR (or an improved set of size-neutral parameters based on the Pan-European indicator set): the assessment would compare countries’ performance to the pre-identified specific national thresholds. The obvious problem is that countries are unlikely to set thresholds which they will not achieve, so that, at the end of the process, all countries would be assessed as “sustainable”. Such an outcome would have little credibility with civil society, or indeed with other sectors. The necessary conditions for a credible assessment exercise based on nationally set thresholds are that:

- the thresholds are set in an open international process, before the data are collected;
- the nationally set thresholds are subject to review or comment by other participating countries, and
- the whole process is transparent, and preferably participatory, similar to an NFP process at the national level.

There should be a direct link between the thresholds listed at the international level and domestic policy objectives. Such a concept is not impossible: in fact a similar approach is used for climate change (INDCs - Intended Nationally Determined Contributions) and biodiversity (the Global Biodiversity Outlook, prepared by the Convention on Biological Diversity, measures countries’ progress towards their targets, which vary widely). If such an approach were considered desirable, considerable political will would be necessary to carry through the process of setting credible sustainability thresholds on sensitive and complex matters. A process which did not reach consensus, or was not sufficiently ambitious in its outcome, would be counterproductive.

5.5 Weak impact of the SEMAFOR results, and possible remedies

The data-driven process of the pilot study, based on dialogue between Joint UNECE/FAO Forestry and Timber Section and national correspondents, has resulted in country tables. These tables are detailed, comprehensive, objective, comparable and transparent, but

¹⁹ Indicators 1.1 (area of forest and FAWS), 1.2 (growing stock), 4.1 (species composition), 4.2 (regeneration), 4.4 (invasive species), 4.5 (deadwood), 5.1 and 5.2 (protective forest), 6.6 (accident rates).

complex, and without clear conclusions as to sustainability of forest management at the national level. Indeed, in most cases, it has not been possible to identify clearly any area of concern; further investigation of the circumstances underlying each case when the parameter exceeded the threshold has uncovered data issues, and national contexts which make it difficult to make a clear final assessment on an objective basis. The results are unlikely to attract attention outside circles specialising in assessing the sustainability of forest management. As they stand at present, the SEMAFOR results are unlikely to have an impact on the perceptions in society as a whole of the sustainability of forest management in Europe. It would be possible to improve presentation, for instance by the use of more figures and graphs, but the main obstacle remains the lack of a clear and objective definition of what constitutes sustainable forest management in Europe, linked to the problem of defining the thresholds discussed above. It is also not clear that it makes sense, except in extreme cases, to conceive of sustainability as a simple binary (yes/no) concept, given the multiple dimensions, the inevitable uncertainties and the need to balance differing points of view and value systems.

The impact of the results would probably be increased if there was a clear sustainable/unsustainable judgement at the country level. However, experience with the SEMAFOR approach has shown that such a judgement would be, at best, superficial and, at worst, misleading. Some form of composite index, perhaps rating sustainability of forest management on a scale of 0-100, would have impact, but calculating such an index in a balanced and comprehensive way would be challenging. In any case, an index would have to be based on a subset of the Pan-European indicator set, with a maximum of 5-10 indicators, and a clear rating system for each indicator and a weighting system to combine the ratings. This approach would gain in clarity and impact, but would lose a lot in comprehensiveness and sensitivity to national circumstances.

6 Conclusions

The SEMAFOR pilot study has tested an approach to assess the sustainability of forest management in Europe, on the basis of the Pan-European indicators. The approach is based on the use of scale-neutral parameters to describe the context of forestry in a country and to assess its sustainability by comparison with a set of internationally agreed thresholds. There are 27 context parameters, covering both quantitative and qualitative aspects and 20 assessment parameters. Only the latter have thresholds. When these thresholds were exceeded, national correspondents were asked to review the accuracy of the data, and to describe the background and context, as well as the policy response, if any.

The pilot study presents the results, by indicator and by country, including the remarks by the correspondents on cases where the thresholds were exceeded.

Twenty countries, accounting for nearly two thirds of Europe's forest area (excluding the Russian Federation), participated in the pilot study. Data were available for about 85% of the assessment indicators. At the first stage of the process, 18% of the data supplied exceeded the agreed thresholds, while 67% did not. After dialogue with national correspondents, it appeared that in the majority of the cases where the thresholds were exceeded, there were valid reasons in the national context to show that there was in fact no threat to sustainability.

Overall therefore, on the basis of the thresholds agreed for the pilot study, and taking account of the indicators recorded and the explanations given, there is no evidence of significant areas of concern with regards to sustainable forest management in the twenty countries, which participated in the pilot study. Just under 15% of the assessment indicators were "No data", which might indicate some sustainability issues, but might also indicate technical measurement challenges or simply low priority for monitoring.

The pilot study has established the feasibility of collecting and analysing the context and assessment indicators, on the basis of already available data, producing meaningful and objective results, after dialogue with national correspondents.

The country tables generated for SEMAFOR (annex 1) provide quantified standard descriptions of the sustainability of forest management at the national level. The asterisks draw attention to areas where agreed thresholds have been exceeded and which have been the subject of a dialogue with the national correspondents.

Questions for future discussion, in the light of the SEMAFOR experience, include the use of common thresholds, and how to set the levels for future assessment work, as well as the possible use of nationally set thresholds. It would also be desirable to increase the impact of the outputs by clarifying their core message.

Development of SEMAFOR can also be seen as support to the development and improvement of sets of indicators, testing concepts and whether parameters can be assessed in a meaningful way. The experience of the SEMAFOR analysis should be taken into account in the next revision of the Pan-European indicators.

7 List of references

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Annex

Context parameters

Parameter	Unit	Bosnia and Herzegovina	Bulgaria	Croatia	Czech Republic	Denmark	Finland	France
Area of forest as % of total land area (forest cover)	%	41.3	35.2	34.3	34.5	14.4	73.1	31.0
1.1-Forest/population ratio	ha forest/head	0.55	0.53	0.45	0.25	0.11	4.08	0.26
1.2-Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	185.5	222.3	223.4	291.6	202.2	107.9	168.4
3.3-Value of marketed non-wood goods, per hectare of FOWL	€/ha FOWL	No data	0.1	0.8	No data	223.0	2.3	3.1
3.4-Value of marketed services, per hectare of FOWL	€/ha of forest	No data	No data	8.4	No data	237.0	No data	3.5
4.3-Share of forest undisturbed by man in forest	%	No data	16.0	0.4	0.4	5.6	1.0	0.0
4.3-Share of plantations in forest	%	6.1	19.9	5.3	0.0	75.8	30.5	11.6
4.3-Share of introduced (including invasive) tree species in FOWL	%	No data	5.4	3.4	1.0	45.4	0.1	8.4
6.1-Share of publicly owned forest, most recent period	%	78.6	87.9	71.7	76.6	23.7	30.4	24.7
6.1-Percentage of private forest area in size class of holdings under 10 ha	%	No data	No data	96.0	46.1	36.9	No data	No data
6.2-Share of GDP taken by forest sector, most recent period	%	No data	0.29	0.50	0.58	0.14	1.78	0.12
6.4-Net government expenditure per hectare forest, average of most recent two periods	€/ha	No data	0.03	3.00	No data	-2.00	Na data	31.00
6.5-Forestry labour force as % of total workforce	%	No data	0.65	No data	0.30	0.07	0.93	0.12
6.7-Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	0.51	0.79	0.98	1.31	1.92	3.63	1.37
6.8-Net imports of roundwood and forest products as % of apparent consumption(both in m ³ roundwood equivalent), most recent 3-year average	%	-77.17	-18.68	-26.49	-24.51	56.98	-249.08	9.16
6.9-Share of wood in total primary energy supply	%	3.7	No data	5.0	4.3	10.0	21.9	3.6
6.9-Share of direct woody biomass removals for energy purposes in total wood biomass removals (from forests and outside forests)	%	22.6	9.0	No data	29.9	111.4	22.8	55.2
A1. Date and status of NFP or similar	Date of NFP or similar	No data	2013	2003	2003	2014	1993	2006
A1. Date and status of NFP or similar	Status of NFP or similar	No data	Forest Europe principles	Formal	Formal	Formal	Formal	Formal
A2. Number of staff who formulate and administer forest policy and law	Number/ 1,000,000 ha	No data	39.5	46.8	No data	No data	5.4	24.4
A3. Date of forest law and of most recent formal statement of forest policy	Date of forest law [D-M-Y]	No data	2011	28/11/05	03/11/95	2004	01/01/97	1827
A3. Date of forest law and of most recent formal statement of forest policy	Date of amendment [D-M-Y]	No data	2014	08/08/14	01/05/14	2014	20/12/13	2012/14
A3. Date of forest law and of most recent formal statement of forest policy	Date of policy statement	No data	2013	2006	2008	2002	2014	2006
A4 Total official transfer payments/ subsidies, in €/ha of private forest	€/ha of private forest	No data	0.0	No data	No data	No data	9.73	No data
A4 Payment from public budget to SFO, and contribution by SFO to public budget, net transfer, in €/ha of public forest	€/ha public forests	No data	2.80	No data	No data	No data	5.00	47.59
A4 Payment from public budget to SFO, and contribution by SFO to public budget, net transfer, in €/ha of public forest	Net transfer €/ha	No data	No data	No data	No data	No data	No data	No data
A4 Public expenditure on research, education and training per hectare of forest, €/ha	€/ha	No data	0.10	0.70	No data	No data	1.99	1.58
A.5 Is there a formal communication and outreach strategy?	Yes/No	No data	Yes	No	Yes	No	Yes	Yes

Germany	Hungary	Ireland	Latvia	Lithuania	Norway	Romania	Serbia	Slovakia	Sweden	Switzerland	Ukraine	United Kingdom
32.8	22.2	10.9	54.0	34.8	39.8	29.2	31.1	40.3	68.4	31.4	16.7	13.0
0.14	0.21	0.16	1.67	0.74	2.38	0.35	0.38	0.36	2.93	0.15	0.21	0.05
320.8	185.9	133.6	195.5	221.6	125.1	279.5	153.7	246.3	120.5	352.6	275.1	207.4
73.6	No data	No data	3.9	7.5	1.1	1.9	10.8	4.6	No data	No data	No data	19.6
No data	No data	No data	8.3	No data	4.9	No data	No data	98.5	2.5	No data	No data	No data
0	0	0	0.5	1.2	1.3	4.1	0.04	1.2	8.6	3.2	0.6	0.0
0	40.4	90.6	0.3	0.0	1	8.3	7.9	1	2.5	0.1	3.8	88.8
1.9	42	0	0.1	0.1	0.5	6.3	0.1	2.9	1.7	0.5	3.9	40.0
52	57.6	53.2	52.3	61.4	12.3	67.0	50.9	50.2	24.3	67.1	92.0	28.4
No data	9.5	21.6	26.6	62.0	2.5	No data	98.7	No data	2.1	22.6	100.0	28.2
0.11	0.23	0.12	3.30	0.50	0.22	0.40	No data	0.33	1.22	0.00	0.26	0.03
No data	No data	169	No data	-13.00	3.00	5.00	-0.45	13.00	No data	No data	No data	65.00
0.11	0.43	0.13	1.97	0.71	0.15	0.58	0.31	0.82	0.62	0.19	0.34	0.07
1.71	0.84	0.66	2.37	1.94	2.31	0.68	1.44	1.21	2.86	1.36	0.40	0.99
-0.01	13.96	-0.3	-155.23	-10.13	-29.26	-33.40	16.58	-46.90	-216.64	5.64	-21.61	59.76
4.3	3.6	1.1	26.6	12.5	4.2	10.3	13.6	4.9	20.5	4.2	1.3	1.1
56.4	No data	8.7	No data	31.6	22.5	No data	78.2	14.5	22.9	38.6	No data	33.1
No data	2007	2014	2006	No data	1998	2014	2011	2006	2014	2002	2010	2003
No data	Formal	Formal	Formal	No data	Guided, similar	Similar	Similar	Formal	Formal	Formal	Formal	Similar
No data	236.818	110.080	211.3	No data	No data	62.1	22.0	113.4	52.0	287.1	75.0	No data
No data	10/07/09	1946	17/03/00	No data	01/01/06	2015	2010	01/09/05	1979	01/01/93	1994/2006	1967/2010
No data		2014	13/10/11	No data	01/06/14	2008	2012	11/07/14	01/09/14	01/07/13	2014	No data
No data	2004	2014	1998	No data	No data	2014	2006	2007	2008	2011	2010	2011
No data	62.83	334.07	No data	No data	4.36	0.23	0.40	19.59	5.47	164.54	No data	48.56
No data	112.22	8.94	No data	No data	28.23	No data	No data	15.81	No data	No data	No data	78.44
No data	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data
No data	5.37	No data	No data	No data	No data	0.47	0.06	1.03	2.28	No data	No data	4.64
Yes	No	No	No	No data	No	Yes	No	No	Yes	No	No	Yes

Assessment parameters

Indicator	Assessment parameter	Unit	Warning level	Bosnia and Herzegovina	Bulgaria	Croatia	Czech Republic	Denmark	Finland	France
1.1 Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	-0.33*	0.46	0.10	0.08	0.94	0.03	0.69
1.1 Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	No data	-1.45*	-0.03*	-0.90*	0.70	-0.30*	0.53
1.2 Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	0.92	2.67	1.00	-0.48*	1.02	0.46	1.27
2.1 Deposition of air pollutants	Percentage of natural ecosystem area (all EUNIS classes) at risk of eutrophication 2010	%	>80%	70	91*	89*	91*	100*	8	84*
2.2 Soil condition	C/N index, median value for country	C/N	<1	No data	No data	No data	1.14	1.09	1.31	1.12
2.4 Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	No data	4.58	4.83	2.37	2.26	0.28	No data
2.4 Forest damage	Percent of forest area with damage by fire (ten-year average)	%	>2%	0.249	0.514	0.224	0.010	0.000	0.023	0.110
3.1 Increment and fellings	Ratio fellings/NAI on FAWS, most recent ten-year period	%	>100%	56.0	37.3	60.0	80.4	81.6	79.5	47.3
3.2 Roundwood	Value of marketed roundwood, per hectare, 2012	€/ha of FAWS	<€10/ha	No data	No data	No data	385.77	237.00	96.99	104.61
3.5 Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	No data	99.4	100.0	100.0	67.0	95.1	44.8*
4.1 Tree species composition	Change in share of multi species stands in FOWL, most recent period	%	Any negative change, compared to previous period	No data	-4.6*	-2.1*	2.0	1.2	4.7	1.9
4.2 Regeneration	Change in share of natural regeneration in total regeneration, change over most recent ten-year period	%	Any decrease	No data	-11.46*	0.65	0.02	3.29	-6.63*	No data
4.4 Introduced tree species	Change in share of invasive species, most recent 10 year period	%	Any increase	No data	No data	0.02*	0.00	-0.72	0.00	No data
4.5 Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports	m ³ /ha	Any decrease	No data	No data	No data	0.0	0.1	-0.1*	No data
4.8 Threatened forest tree species	Number of threatened forest tree species as % of total forest tree species	%	Lack of information on parameter	1.0	0.0	4.4	5.4	17.1	16.1	No data on total forest tree species
4.9 Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	No data	3.9	2.8*	4.9	1.3*	12.0	0.6*
5.1 and 5.2 Protective forests	Change in area of forest designated as having protective functions over period (5.1+5.2)	ha	Decrease	No data	-82*	14	101	0	-347*	No data
6.3 Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha	<€5/ha	0.34*	55.36	No data	139.87	489.74	93.14	62.61
6.6 Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate per 1,000	Increase in accident rate and/or lack of information on accident rates	No data*	No data*	-14.79	-9.81	0.00	No data*	-19.02
6.10 Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	100	94	99	100	100	100	25*

Note: when a parameter exceeds the agreed threshold, there is an apparent area of concern, which is addressed by the comments by the national correspondent, as regards data quality, context and, if appropriate, policy response.

* = threshold exceeded. Please consult discussion in the country sheet

Germany	Hungary	Ireland	Latvia	Lithuania	Norway	Romania	Serbia	Slovakia	Sweden	Switzerland	Ukraine	United Kingdom
0.03	0.42	0.82	0.18	0.27	0.02	0.71	0.94	0.04	-0.05*	0.3	0.09	0.4
0.02	0.55	0.87	0.2	0.27	-0.16*	-0.87*	0.94	0.19	-0.2*	0.26	-0.78*	0.4
0.44	0.88	2.88	1.79	0.49	1.47	1.93	3.45	0.09	-0.03*	0.43	1.84	1.96
54	100*	17	92*	99*	3	20	95*	95*	30	74	100*	43
1.12	1.42	1.18	1.02	1.72	No data	No data	No data	1.49	1.28	No data	No data	1.26
No data	8.09*	No data	0.26	4.38	No data	22.52*	2.99	1.45	4.29	0.89	0.12	No data
0.004	0.064	0.09	0.002	0.014	No data	0.02	0.03	0.047	0.003	0.004	0.033	No data
78.5	80.0	52.5	76.5	82.9	46.4	54.7	50.6	67.2	110*	88.6	23.9	48.2
325.56	No data	No data	144.5	136	53.2	No data	0.17*	180.33	142.16	No data	No data	131.18
66.0	100.0	72.4	E	100	27.9*	84.3	83.0	100	96.2	81.7	100	49.7*
No data	1.5	No data	No data	No data	No data	No data	No data	1.1	0.6	1.9	0.2	No data
1.31	0.08	-3.13*	3.15	-1.63*	-1.15*	0.01	-1.41*	1.07	-9.82*	-1.05*	0	No data
0.00	2.84*	No data	0	0	0	No data	0	0.4*	0	0.0	0.01	No data
-3.1*	No data	1	5.8	0	2.6	No data	0.3	No data	0.3	2.5	0.1	0
8.8	17.0	0	12	0	0	No data*	No data*	12.3	23.3	6.5	No data on total forest tree species	No data on total forest tree species
1.9*	0.6*	No data	5.8	5.1	3.5	3.4	4.8	3.7	6.6	2.5*	5.4	1.4*
1,635	-20*	No data	60	16	0	78	12	41	138	8	-84*	0
115.66	75.12	No data	48.1	43.09	-0.02*	18.43	No data	28.39	52.5	-79.44*	No data	-49.8*
-570 (not rate but change in total injuries)	-0.85	-2.75	-1.32	-0.2	-2.3	-0.01	No data*	-1.82	-3.5	-5.07	-0.8	0.7*
95	98	56*	93	99	100	No data	100	94	100	100	50*	45*

Country tables

This annex contains the data for each country: context indicators (quantitative and qualitative), assessment indicators and discussion of the parameters for which the thresholds were exceeded.

Country tables: Bosnia and Herzegovina

Indicator		Context parameter	Unit	Value
1.1	Forest area	Area of forest as % of total land area (forest cover)	%	41.3
1.1	Forest area	Forest/population ratio (ha of forest/head of population)	ha/head	0.55
1.2	Growing stock	Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	185.5
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of FOWL, €/ha/year of FOWL	€/ha/year FOWL	No data
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	€/ha	No data
4.3	Naturalness	Share of forest undisturbed by man in forest	%	No data
4.3	Naturalness	Share of plantations in forest	%	6.1
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL	%	No data
6.1	Forest holdings	Share of publicly owned forest, most recent period	%	78.6
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	%	No data
6.2	Contribution of forest sector to GDP	Share of GDP taken by forestry, most recent period	%	n/a
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods	€/ha	No data
6.5	Forest sector workforce	Forestry labour force as % of total workforce	%	No data
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	0.51
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ RE), most recent 3-year average	%	-77.17
6.9	Energy from wood resources	Share of wood in total primary energy supply	%	3.7
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes in total wood biomass removals	%	22.6

Policy and institutions (qualitative indicators)

Bosnia and Herzegovina did not submit a report on qualitative indicators in the context of the pan-European reporting 2015.

Indicator		Assessment parameter	Unit	Threshold	Value
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	-0.33
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	No data
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	0.92
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication 2010	%	>80%	81
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	No data
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	No data
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	0.249
3.1	Increment and fellings	Ratio fellings/NAI on FAWS, most recent ten-year period, in %	%	>100%	56.0
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha/year	<€10/ha/year	No data
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	No data
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Change in %	Any negative change, compared to previous period	No data
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Change in %	Any decrease	No data
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Change in %	Any increase	No data
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Change in m ³ /ha	Any decrease	No data
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	1.0
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	No data
5.1 & 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	No data
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha/year	< €5/ha/year	0.34
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	No data
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	100

Discussion of parameters for which the threshold was exceeded

Comments from the national correspondent:

The number of 5.5 million m³ of net annual average volume increment in FAWS in Bosnia and Herzegovina is, according to my opinion too low. It ranges around 11 million m³ gross annual increment. This is estimated as follows:

State/publicly owned forests (~ 80% of all forests), gross annual volume increment of wood (≥ 7 cm on thinner end) for 2010: 9.3 million m³ o.b.

Private forests (rough estimate): around 2 million m³ (~ 1.25 million m³ in 2013 in Republika Srpska, no data for Federation of Bosnia and Herzegovina).

No data about natural losses, but it may be acceptable to reduce gross volume increment by 15-20%.

We still do not have transparently available data from forest inventory on large scale done between 2009 and 2011 on the whole territory of Bosnia and Herzegovina.

In the light of the above estimate, the NAI for Bosnia and Herzegovina has been set at 9.35 million m³, giving a felling/NAI ratio of 56%, assuming the same level of fellings.

Regarding area of FAWS as our categorization of forests and forest land differs from internationally recognized division on forests and other wooded land, in Pan-European questionnaire we decided (using the same approach as in Croatia another former Yugoslav republic, which used the same categorization) to put together areas of high forests with natural regeneration, high degraded forests, forest plantations and coppice forests all in state ownership and total area of private forests and consider that as FAWS. This area could be, according to my opinion, with high accuracy (or with minor difference) understood as FAWS, with different economic characteristics (although we didn't decide to put it in the Pan-European). The other wooded land put in Pan European consists of barren forest land in all categories and mined areas also in all categories.

Country tables: Bulgaria:

Indicator		Context parameter	Unit	Value
1.1	Forest area	Area of forest as % of total land area (forest cover)	%	35.2
1.1	Forest area	Forest/population ratio (ha of forest/head of population)	ha/head	0.53
1.2	Growing stock	Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	222.3
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of FOWL, €/ha/year of FOWL	€/ha/year FOWL	0.1
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	€/ha	No data
4.3	Naturalness	Share of forest undisturbed by man in forest	%	16
4.3	Naturalness	Share of plantations in forest	%	19.9
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL	%	5.4
6.1	Forest holdings	Share of publicly owned forest, most recent period	%	87.9
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	%	No data
6.2	Contribution of forest sector to GDP	Share of GDP taken by forestry, most recent period	%	0.29
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods	€/ha	0.03
6.5	Forest sector workforce	Forestry labour force as % of total workforce	%	0.65
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	0.79
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ RE), most recent 3-year average	%	-18.68
6.9	Energy from wood resources	Share of wood in total primary energy supply	%	No data
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes in total wood biomass removals	%	9

Policy and institutions (qualitative indicators)

Indicator		Context parameter	Unit	Value
A1	National forest programmes or similar	Starting date of national forest programme or similar	Year	2013
A1	National forest programmes or similar	Type of national forest programme	Type	Guided by FE NFP principles
A2	Institutional framework	Number of staff who formulate and administer forest policy and law	Number/1,000,000 ha of forest	39.5
A3	Legal regulatory framework and international commitments	Date of enactment of forest law	Year	2011
A3	Legal regulatory framework and international commitments	Date of most recent amendment of forest law	Year	2014
A3	Legal regulatory framework and international commitments	Date of most recent formal statement of forest policy	Year	2013
A4	Financial instruments/economic policy	Total official transfer payments/subsidies	€/ha/year of private forest	0
A4	Financial instruments/economic policy	Payment from public budget to state forest organisation	€/ha/year of public forest	2.8
A4	Financial instruments/economic policy	Public expenditure on research, education and training per hectare of forest	€/ha/year	0.1
A5	Informational means	Existence of a formal communication and outreach strategy	Yes/No	Yes

Indicator		Assessment parameter	Unit	Threshold	Value
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	0.46
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	-1.45
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	2.67
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication 2010	%	>80%	91
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	No data
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	4.58
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	0.514
3.1	Increment and fellings	Ratio fellings/NAI on FAWS, most recent ten-year period, in %	%	>100%	37.3
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha/year	<€10/ha/year	No data
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	99.4
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Change in %	Any negative change, compared to previous period	-4.6
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Change in %	Any decrease	-11.46
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Change in %	Any increase	No data
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Change in m ³ /ha	Any decrease	No data
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	0
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	3.9
5.1 & 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	-82
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha/year	< €5/ha/year	55.36
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	No data
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	94

Discussion of parameters for which the threshold was exceeded

(For layout reasons, some of the extensive comments are shown below the table)

Parameter	Warning level	Value recorded	Are data accurate?	Background and context	Policy response
1.1 Annual average percent change in area of forest available for wood supply in most recent ten-year period	any negative change	-1.45% per year	The indicated negative change of 1.45 % relates to category FAWS, not to the whole forest area in the country	This trend does not indicate that increased harvesting causes decrease of FAWS. The reason is the exclusion of forest land from FAWS category and including it in other categories. The trend related to the total forest area is positive and is about 4.5% for the last ten year period.	The decrease in FAWS is due to the following main reasons: See below
2.1 Percentage of natural ecosystem area at risk of eutrophication for an emission scenario based on current legislation	> 80	91	The Executive Forest Agency does not provide any data on this parameter and is not responsible for such data in the country. EFA does not have any information for the origin and interpretation of the data.	The data on air pollutants were pre-filled by UNECE and "Forest Europe". As there is no information about the pre-filled data in SoEF –the source was not indicated by UNECE we cannot explain the given percentage (91%) or the eutrophication issue.	The Ministry of Environment and Water and the Executive Environmental Agency are the institutions collecting and delivering data on air pollution. The forest service is not responsible for this information in Bulgaria and does not have information on their origin. See below
4.1 Share of multi species stands in FOWL, most recent period	Any negative change	-4.6 %		The national forest policy is directed to strengthen the process of transformation of forest stands into mixed forests. The natural regeneration processes prevail. See below.	
4.2 Share of natural regeneration in total regeneration, change over most recent 10 year period,	Any decrease	-11.6		As there were significant areas of low quality forests in the middle of twentieth century the state policy was directed to gradual reconstruction of these stands to high-stem ones through afforestation and/or supporting the processes of natural regeneration. See below	
5.1 and 5.2 Change in area of forest designated as having protective functions (5.1+5.2)	Any decrease	-82 ha		Decrease caused by change in the statute of protective forests which were transferred of forest territories from category "Protective" to category "Protected" forests. See below	
6.6 Total fatal and non-fatal accidents per 1000 workers: change over two most recent reports (centred on 2005 and 2010)	Increase in accident rate and/or lack of information on accident rates	No data supplied		N/A	No data available for the sector in the Executive Forest Agency

1.1 Change in FAWS

Reasons are difficult access to some mountain forests and therefore no utilization in such areas of some forests designated for wood supply;

Government decision (as pointed out in the legislation in 2015) to declare 103,000 hectares as water-protective forests in mountain regions, important for water supply of the population;

After the accession of the country to the European Union in 2007, some forest areas previously designated for wood supply were included in Natura 2000 and so excluded from FAWS.

2.1 Area at risk of eutrophication

As according to SoEF, data on Indicator 2.1. are not presented on a country basis, please contact the responsible international institutions delivering the data and communicate on the relevant conclusions²⁰.

4.1 Multi-species stands

At the end of 19th century and in the beginning of the 20th huge forest areas in Bulgaria were destroyed. To restore the forest in 1950-1960 afforestation on a large scale was accomplished. The newly established plantations were composed of one main coniferous species which accounted for more than 80%. Over time, because of natural regeneration, a second storey of indigenous broadleaved species develops and the composition of the plantations changes from monoculture to mixed seed stands. Around the age of 50-60 years the conifer plantations started to decline due to the fact, that they are created out of their natural region of distribution. Due to the process of natural regeneration the coniferous species were replaced by broadleaved species – mainly beech (*Fagus sylvatica* L.), followed by oak (*Quercus* sp.), hornbeam (*Carpinus* sp.), etc. In the early stages of its development beech forms dense single species stands and depresses other species. That is why these newly formed natural stands are qualified in the category "area with 1 number of species occurring", but the process cannot be interpreted as a loss of multi species composition

4.2 Natural regeneration

Up to 2005 there was a special category of low quality natural forest stands foreseen for reconstruction. In 2010 this category was eliminated in the forest management plans and the stands under it were redistributed to the categories of "high forest" or "coppice" stands according to their origin. This led to subtraction of the part of the forests for reconstruction with natural seed regeneration and their inclusion into the category "coppice".

5.1 and 5.2 Forest designated with protective functions

In 2015 103,000 ha were designated as water-protective forests. Part of the protective forests (mostly water-protective, especially in mountain regions and anti-erosion forests, etc.) after EU accession and introduction of NATURA 2000 network in the country were included into the category "Protected forests". Please note the big increase in protected forests in 2010.

The total area of protective, recreational and protected forests increased towards 2010.

²⁰ Note by the secretariat: see discussion of the methods of the EEA study in the main text.

Country tables: Croatia

Indicator		Context parameter	Unit	Value
1.1	Forest area	Area of forest as % of total land area (forest cover)	%	34.3
1.1	Forest area	Forest/population ratio (ha of forest/head of population)	ha/head	0.45
1.2	Growing stock	Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	223.4
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of FOWL, €/ha/year of FOWL	€/ha/year FOWL	0.8
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	€/ha	8.4
4.3	Naturalness	Share of forest undisturbed by man in forest	%	0.4
4.3	Naturalness	Share of plantations in forest	%	5.3
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL	%	3.4
6.1	Forest holdings	Share of publicly owned forest, most recent period	%	71.7
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	%	96
6.2	Contribution of forest sector to GDP	Share of GDP taken by forestry, most recent period	%	0.50
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods	€/ha	3
6.5	Forest sector workforce	Forestry labour force as % of total workforce	%	No data
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	0.98
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ RE), most recent 3-year average	%	-26.49
6.9	Energy from wood resources	Share of wood in total primary energy supply	%	5.0
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes in total wood biomass removals	%	30.8

Policy and institutions (qualitative indicators)

Indicator		Context parameter	Unit	Value
A1	National forest programmes or similar	Starting date of national forest programme or similar	Year	2003
A1	National forest programmes or similar	Type of national forest programme	Type	Formal
A2	Institutional framework	Number of staff who formulate and administer forest policy and law	Number/1,000,000 ha of forest	46
A3	Legal regulatory framework and international commitments	Date of enactment of forest law	Year	2005
A3	Legal regulatory framework and international commitments	Date of most recent amendment of forest law	Year	2014
A3	Legal regulatory framework and international commitments	Date of most recent formal statement of forest policy	Year	2006
A4	Financial instruments/economic policy	Total official transfer payments/subsidies	€/ha/year of private forest	No data
A4	Financial instruments/economic policy	Payment from public budget to state forest organisation	€/ha/year of public forest	No data
A4	Financial instruments/economic policy	Public expenditure on research, education and training per hectare of forest	€/ha/year	0.70
A5	Informational means	Existence of a formal communication and outreach strategy	Yes/No	No

Indicator		Assessment parameter	Unit	Threshold	Value
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	0.1
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	-0.03
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	1
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication 2010	%	>80%	100
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	No data
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	4.83
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	0.224
3.1	Increment and fellings	Ratio fellings/NAI on FAWS, most recent ten-year period, in %	%	>100%	60
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha/year	<€10/ha/year	No data
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	100
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Change in %	Any negative change, compared to previous period	-2.1
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Change in %	Any decrease	0.65
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Change in %	Any increase	0.02
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Change in m ³ /ha	Any decrease	No data
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	4.4
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	2.8
5.1 & 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	14
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha/year	< €5/ha/year	No data
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	-14.79
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	99

Discussion of parameters for which the threshold was exceeded

(For layout reasons, some of the extensive comments are shown below the table)

Parameter	Threshold	Value recorded initially	Are data accurate?	Background and context	Policy response
1.1 Annual average percent change in area of forest available for wood supply in most recent ten-year period	Any negative change	-0.03%	Average decline of about 0.03% per year See below	Trend not due to deforestation, but to reclassification of FAWS as protected areas. See below	
2.1 Percentage of natural ecosystem area at risk of eutrophication for an emission scenario based on current legislation	>80%	100%	Forest-based surveys show eutrophication compounds not so high See below	Most pollution trans boundary in nature. Croatian forest structure helps resilience See below	Croatia is participating actively in international monitoring and cooperation. See below
4.1 Share of multi species stands in FOWL, most recent period, %	Any negative change, compared to previous period	-2.1%	Small decrease noted	Administrative changes have brought smaller, more homogeneous stands See below	NA
4.4 Change in share of invasive species, most recent 10 year period, %	Any increase	0.02%		<i>Robinia pseudoacacia</i> is actively managed. See below	No concern because of existing regulations for invasive species. See below
4.9 Area of forest strictly protected for conservation of biodiversity as % of total forest	<3%	2.8%		Protected area has doubled over last 25 years, and has nearly reached 3%. NATURA 2000 accounts for 36.3% of land area. See below	

1.1 Change in area of FAWS

Accuracy of data: Change in area of forests available for wood supply (FAWS) in 2015 is estimated about 1,000 hectares less than 10 years earlier. According to definition, forests available for wood supply are forest where any legal, economic, environmental or other specific restrictions do not have a significant impact on the supply of wood.

In the period from 1990-2015 area of forest in this category has decreased by about 18, 000 hectares (around 1% or 0.04% average per year). In the last ten years there has been a decrease of about 5,000 hectares, which is around 0.03% average per year.

Background and context: We need to emphasize that the reason for decreasing of forest area is not deforestation because the total area of forests in Croatia has been constantly increasing in the last five years. One reason for the decreasing area of FAWS lies in the fact that there has been an increase of

strictly protected areas (in the period 1990-2015 protected area of two National parks-Plitvička jezera and Risnjak have been increased, and a new national park, Sjeverni Velebit, has been established). Secondly, a part of degraded forests in the karstic area have been excluded from the category of commercial forest (used for production of forest products) and were included in the category of protective forests.

In the upcoming period we can expect a continuing decrease of FAWS due to the change of forests designation and additional restrictions brought by Natura 2000.

2.1 Area at risk of eutrophication

Accuracy of data: Croatian data on deposition of eutrophication compounds in last 4 years on the specific plots (include forest management unit level) shows that the amount of compounds mostly responsible for eutrophication is not so high and do not extend the CL, but it doesn't represent the whole forest area in Croatia

Background and context: Croatia has only moderate levels of own atmospheric pollution due to low industrial activity as well as farming. Therefore, most of the deposition into our forests comes from transboundary air pollution. However, the risk of eutrophication exists, depending on the level of deposition and the type of forest ecosystem. The situation is helped by the fact that most of the forests in Croatia (95%) have natural composition and natural, multi-layer structure, and are growing on undisturbed forest soils, which all consequently makes them very resilient to air pollution effects

Policy response: Croatia is actively participating in forest monitoring, providing data to international bodies (through UNECE-ICP Forests/CLRTAP). This participation is regulated through the national Forest Law. Furthermore, State Meteorological Service is an active member of UNECE ICP Monitoring and Mapping. Croatia is also dedicated to sustainable forestry, maintaining natural stand structure and natural species composition, which results with strengthening of self-regulating mechanisms of forests, as well as mitigating potential negative effects of air pollution

4.1 Multi-species stands

Accuracy of data: There has been a small decrease of forest and other wooded land area with 2-3 major species in forest stands in the 2005-2010 period.

Background and context: The main reason for this decrease lies in the administrative change of management units division principle - some bigger heterogeneous stands (compartments) have been divided into several smaller homogeneous stands. That can be confirmed by the fact that the average compartment area in regular-aged forests in the last ten years has decreased by about 9%, from 12.71 hectares to 11.62 hectares.

4.4 Invasive species

Background and context: The very low increase in the share of invasive species (0.02%) is due to the presence of the major invasive species in Croatian forests - *Robinia pseudoacacia*, which is actively managed

Policy response: There is no further reason for concern over spreading of Robinia due to the strict nature protection conditions regarding planting and spreading of allochthonous tree species which are incorporated in all forest management plans

4.9 Protected areas

Background and context, policy response: Although the area of strictly protected forest has been doubled in the last 25 years due to enlargement of National parks as well as establishment of one new National park, there is only 0.2% area missing to reach a proposed minimum level of 3%. We assume that we will reach the given goal in a short period of time due to a common trend in nature protection policy, which can be seen in enlargement of the protected areas in all categories. We also need to emphasize that Croatia has established NATURA 2000 ecological network on 36.73% of its terrestrial area (proposed sites of Community importance (pSCI) on 28.64% and SPA on 30.22%).

Country tables: Czech Republic

Indicator		Context parameter	Unit	Value
1.1	Forest area	Area of forest as % of total land area (forest cover)	%	34.5
1.1	Forest area	Forest/population ratio (ha of forest/head of population)	ha/head	0.25
1.2	Growing stock	Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	291.6
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of FOWL, €/ha/year of FOWL	€/ha/year FOWL	No data
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	€/ha	No data
4.3	Naturalness	Share of forest undisturbed by man in forest	%	0.4
4.3	Naturalness	Share of plantations in forest	%	0.0
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL	%	1.0
6.1	Forest holdings	Share of publicly owned forest, most recent period	%	76.6
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	%	46.1
6.2	Contribution of forest sector to GDP	Share of GDP taken by forestry, most recent period	%	0.58
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods	€/ha	No data
6.5	Forest sector workforce	Forestry labour force as % of total workforce	%	0.30
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	1.31
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ RE), most recent 3-year average	%	-24.51
6.9	Energy from wood resources	Share of wood in total primary energy supply	%	4.3
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes in total wood biomass removals	%	29.9

Policy and institutions (qualitative indicators)

Indicator		Context parameter	Unit	Value
A1	National forest programmes or similar	Starting date of national forest programme or similar	Year	2003
A1	National forest programmes or similar	Type of national forest programme	Type	Formal
A2	Institutional framework	Number of staff who formulate and administer forest policy and law	Number/1,000,000 ha of forest	No data
A3	Legal regulatory framework and international commitments	Date of enactment of forest law	Year	1995
A3	Legal regulatory framework and international commitments	Date of most recent amendment of forest law	Year	2014
A3	Legal regulatory framework and international commitments	Date of most recent formal statement of forest policy	Year	2008
A4	Financial instruments/economic policy	Total official transfer payments/subsidies	€/ha/year of private forest	No data
A4	Financial instruments/economic policy	Payment from public budget to state forest organisation	€/ha/year of public forest	No data
A4	Financial instruments/economic policy	Public expenditure on research, education and training per hectare of forest	€/ha/year	No data
A5	Informational means	Existence of a formal communication and outreach strategy	Yes/No	Yes

Indicator		Assessment parameter	Unit	Threshold	Value
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	0.08
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	-0.9
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	-0.48
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication 2010	%	>80%	91
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	1.14
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	2.37
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	0.01
3.1	Increment and fellings	Ratio fellings/NAI on FAWS, most recent ten-year period, in %	%	>100%	80.4
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha/year	<€10/ha/year	385.77
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	100
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Change in %	Any negative change, compared to previous period	2
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Change in %	Any decrease	0.02
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Change in %	Any increase	0.00
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Change in m ³ /ha	Any decrease	0.0
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	5.4
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	4.9
5.1 & 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	101
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha/year	< €5/ha/year	139.87
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	-9.81
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	100

Discussion of parameters for which the threshold was exceeded

(For layout reasons, some of the extensive comments are presented below the table)

Parameter	Threshold	Value	Are data accurate?	Background and context	Policy response
1.1 Annual average percent change in area of forest available for wood supply in most recent ten-year period	Any negative change	-0.9% per year	Both methodology and data availability changes have led to a data set which is not comparable over time. See below	The real trend is probably neutral or slightly negative, partly due to increase in protected areas. See below	Not considered a reason for concern. See below
1.2 Annual average percent change in growing stock on FAWS in most recent ten-year period	Any negative change	-0.48%	The decreasing growing stock relates to FAWS only. All comments related to 1.1. relate therefore to this area of concern as well. Growing stock per hectare of forest is increasing,	As growing stock per hectare is estimated to be increasing, taking account of the comparability problems mentioned, growing stock on FAWS would be neutral or slightly decreasing.	Not a concern. The wood production function is integral part of sustainable forest management, which is the main goal of the National Forest Program in the Czech Republic.
2.1 Percentage of natural ecosystem area at risk of eutrophication for an emission scenario based on current legislation	>80%	91%	According to a national study, the situation is serious but the trend is positive. See below	The deposition of air pollutants is considered as a serious problem in the Czech Republic, with relevant political emphasis	The EU Nitrates directive is one of the main tools for appropriate response.

1.1 Change in area of FAWS

Accuracy of data: FAWS as such is not used in Czech Republic for any domestic reporting. So far estimates based on management plans are being used to distinguish FAWS. In some cases it was not possible to apply improved methodology retrospectively to 2005 figures. According to expert estimates FAWS in 2005 should be somewhere around 2.34 million ha, instead of 2.52 million hectares reported. The other important cause of decline in FAWS is improvement of data, notably more information on nature protection available in forest management.

Both methodology and data availability changes have led to a data set which is not comparable over time.

Background and context: Most of the decrease in FAWS is caused by change in source data quality and methodology of FAWS identification. Based on proxy calculations, the trend of FAWS between 2005 and 2015 should be neutral or very slightly negative.

The major driver of this slight negative change would be nature protection and its impacts (restriction) on forest management. The total forest area on the other hand is increasing by an average of some two thousand hectares per year in last decade.

Policy response: There is no active policy response to halt the decrease of FAWS as this is not considered a reason for concern. Policy emphasis is given to balanced fulfilment of all relevant forest functions and sustainable forest management

2.1 Area at risk of eutrophication

Accuracy of data: According to national study on the state of the forest soil which is based on the ICP FORESTS monitoring, the total deposition of nitrogen ($\text{NO}_y + \text{H}_x$) exceeded the critical loads for nutritional nitrogen on 95% of forests in the Czech Republic in 2007 (100% in 1994).

The same study shows that total potential acidic deposition exceeded critical loads of Sulphur and nitrogen on 45% in 2007 (98.5% in 1994).

Country tables: Denmark

Indicator		Context parameter	Unit	Value
1.1	Forest area	Area of forest as % of total land area (forest cover)	%	14.4
1.1	Forest area	Forest/population ratio (ha of forest/head of population)	ha/head	0.11
1.2	Growing stock	Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	202.2
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of FOWL, €/ha/year of FOWL	€/ha/year FOWL	223.0
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	€/ha	237
4.3	Naturalness	Share of forest undisturbed by man in forest	%	5.6
4.3	Naturalness	Share of plantations in forest	%	75.8
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL	%	45.4
6.1	Forest holdings	Share of publicly owned forest, most recent period	%	23.7
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	%	36.9
6.2	Contribution of forest sector to GDP	Share of GDP taken by forestry, most recent period	%	0.14
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods	€/ha	-2
6.5	Forest sector workforce	Forestry labour force as % of total workforce	%	0.07
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	1.92
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ RE), most recent 3-year average	%	56.98
6.9	Energy from wood resources	Share of wood in total primary energy supply	%	10.0
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes in total wood biomass removals	%	No data

Policy and institutions (qualitative indicators)

Indicator		Context parameter	Unit	Value
A1	National forest programmes or similar	Starting date of national forest programme or similar	Year	2014
A1	National forest programmes or similar	Type of national forest programme	Type	Formal
A2	Institutional framework	Number of staff who formulate and administer forest policy and law	Number/1,000,000 ha of forest	No data
A3	Legal regulatory framework and international commitments	Date of enactment of forest law	Year	2004
A3	Legal regulatory framework and international commitments	Date of most recent amendment of forest law	Year	2014
A3	Legal regulatory framework and international commitments	Date of most recent formal statement of forest policy	Year	2002
A4	Financial instruments/economic policy	Total official transfer payments/subsidies	€/ha/year of private forest	No data
A4	Financial instruments/economic policy	Payment from public budget to state forest organisation	€/ha/year of public forest	No data
A4	Financial instruments/economic policy	Public expenditure on research, education and training per hectare of forest	€/ha/year	No data
A5	Informational means	Existence of a formal communication and outreach strategy	Yes/No	No

Indicator		Assessment parameter	Unit	Threshold	Value
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	0.94
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	0.70
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	1.02
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication 2010	%	>80%	100
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	1.09
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	2.26
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	0
3.1	Increment and felling	Ratio felling/NAI on FAWS, most recent ten-year period, in %	%	>100%	81.6
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha/year	<€10/ha/year	237
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	67
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Change in %	Any negative change, compared to previous period	+1.2
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Change in %	Any decrease	3.29
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Change in %	Any increase	-0.72
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Change in m ³ /ha	Any decrease	0.1
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	17.1
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	1.3
5.1 & 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	0
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha/year	< €5/ha/year	489.74
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	0.00
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	100

Discussion of parameters for which the threshold was exceeded

(For layout reasons, some of the more extensive comments are shown below the table)

Parameter	Threshold	Value	Are data accurate?	Background and context	Policy response
2.1 Percentage of natural ecosystem area at risk of eutrophication for an emission scenario based on current legislation	>80%	100%	According to a national study, 5% of forest area is receiving nitrogen deposition over the carrying capacity, 14% below and 81% around the carrying capacity See below	Eutrophication risk is highest at the forest edge. Because of the fragmented nature of Danish forests, about 1/3 are within 50 meters of the forest edge. See below	Denmark is committed to reducing ammonia emissions by 24% by 2020 See below
4.9 Area of forest strictly protected for conservation of biodiversity as % of total forest	<3%	1.1%	the suggested figure seems to be at the correct level. See below.	As Danish forests reached a very low level around 1820, most forests are now plantations, with little conservation interest. See below	There is a commitment to give priority to halt biodiversity loss and an inventory of high nature value forests is being carried out. See below

2.1 Risk of eutrophication

Accuracy of data: The national correspondent is not sure how the data were obtained, so the comments are merely general. In a more detailed mapping of the Danish nitrogen deposition from 2011 (<http://www2.dmu.dk/Pub/SR30.pdf>), it was estimated that 30,000 hectares of forest area (5%) received more nitrogen than the long term carrying capacity of 10-15 kg N/ha/year and were thus at risk of eutrophication. The study indicated that 87,000 hectares (14%) received less than the carrying capacity and were thus not at risk of eutrophication and the rest (81%) received amounts around the carrying capacity.

Background and context: The Danish forests are mostly fragmented and are in most areas surrounded by intensively managed agricultural land. The forests provide an effective filter of the nutrients and thus contribute to improving air quality. When the nutrients are filtered out of the air they penetrate through the canopy and may then cause eutrophication of the forest environment. The filtering effect is largest near the forest edge and thus also the risk of eutrophication is largest there. However, in the very fragmented forest landscape in Denmark, a large part of the forest may be considered forest edge i.e. around 1/3 of the forest area is less than 50 meters from the edge of the forest.

Policy response: In 2012 Denmark pledged to reduce ammonia emissions by 24% by 2020 compared to 2005 - the equivalent of about 63,000 tonnes. This took place within the UN framework in the so-called Gothenburg Protocol and was based on countries' own projections of existing rules.

3.5 Forest management plans. Original record was 43%, now changed to 67% for the reasons given below:

Accuracy of data. Forests under management plans have been assessed as part of larger questionnaire surveys in 1990, 2000 and 2012. In the latest survey, 43.6% of the forest estates (corresponding to the figure provided by SEMAFOR) had a reasonably updated stand inventory as basis for forest management. However, the area with an updated stand inventory is considerably larger as larger forest estates are more likely to have a forest management plan compared to small estates. Consequently, 67% of the forest area had a reasonably updated forest inventory as basis for forest management, 58% of the forest area was covered by a short term (1-5 years) forest management plan and 50% was covered by a long term (5-20 years) plan. The figure of 67% has been inserted into the table, replacing 43.3%.

Background and context: To some extent, the area under management plan reflects the demography of Danish forests where a large share of the forest estates is quite small. In fact 91% of the forest estates are less than 20 hectares and you would usually not require a management plan for such a small area. Looking at forest estates larger than 100 ha, 77-78% of the estates have a forest management plan, corresponding to 90% of the area of larger estates. The figures reported above do not include management plans for other wooded land, as such areas (typically heathlands, meadows and sand dunes with tree cover) are typically managed with a much different scope and such plans were not included in the surveys.

Policy response: Grants for "Green Management Plans" are given to private forest owners to promote the transition to sustainable management of private forests. The Green Management Plan must contain a status, map and a plan for the protection of the forest's natural assets, and may contain a plan for conversion to natural forest management. These grants are much applied for among forest owners and have increased the forest area covered by management plans substantially

4.1 Share of multi species stands. Original data showed -1.4, now changed to +1.2, for the reasons given below

Accuracy of data: It isn't clear how the suggested decline has been calculated²¹. According to the source data, which has been provided by University of Copenhagen, the latest figures reported were those of 2005 and 2010. For 2005 338,000 hectares out of 526,000 hectares (64.3%) were reported to hold stands with 2 or more species [on a sample plot], whilst the corresponding figures for 2010 were 350,000 hectares out of 534,000 hectares (65.5%). This indicates not a decline but an increase in the share of multi species stands. Consequently, the apparent decline does not seem correct. A recalculation of NFI data from 2005, 2010 and 2014 confirmed that the forest area with more than one tree species was increasing slightly, contrary to the findings by SEMAFOR. The observed change in forest area with more tree species can hardly be statistically significant. The standard error of the forest area estimate is around 1%. When the area under consideration is subdivided into several strata, the relative error increases and become much larger and even more so when looking at differences between two surveys. Consequently the error of the estimate becomes much larger than the "trend" observed by SEMAFOR. [the change is now shown as +1.2]

²¹ Note by the Joint UNECE/FAO Forestry and Timber Section: the parameter used has been share of multi species stands in Forest and other wooded land, not forest. However, in the light of these remarks, it would appear that it would be better (for all countries in the future) to take forest area, not FOWL, as 100%.

Background and context: It should be noted that this indicator will not be consistent among different sampling systems as it is dependent on sample plot size. However, the sample plot size has remained constant through the different inventories in the Danish NFI since 2002 and is thus consistent among these.

Policy response: Several factors may be influencing this indicator. The Danish forest area is currently increasing due to afforestation, which may be subsidized by state. Afforestation projects which receive grants are required to include mixtures of species. Further, reforestation projects and reforestation after wind throw which receive grants are also required to include mixtures of species. In the opposite direction, near natural management of especially beech forests may result in less diverse stands as the light tolerant beech trees are commonly able to shade away competing vegetation. Generally speaking, it would be the expectation that current initiatives to increase nature values in the Danish forest would increase species richness.

4.9 Share of strictly protected forest

Accuracy of data: As also evident from the reporting, the area of strictly protected forest (MCPFE class 1.1 and 1.2) in Denmark is quite small. In the latest assessment a total of 7,248 hectares were strictly protected in accordance with the terms and definitions of the MCPFE. This corresponds to 1.3% of the total forest area of 612,000 hectares. It is unclear, how the review team arrives at only 1.1%²². That said, the suggested figure seems to be at the correct level.

Background and context: The underlying reason for the small area of protected forest is historical. The Danish forest area reached a low point of 3-4% around 1820, and has since increased. At this point, all Danish forests were heavily influenced by human activity, as the easy accessible flat Danish terrain does not prevent utilization of the forest resource. Consequently, a large proportion of the current forest area is plantation forest or has historically been heavily affected by human activity. As a consequence, old growth forests with high nature value has a very limited area, and little effort has been put into protecting more common planted forests from intervention as they were already affected to a large extent.

Policy response: The new Danish government, (June 2015) highlighted in its government declaration its intention to give priority to efforts to halt the decline of biodiversity, and will leave a larger state forest area stand untouched so plants and animals can thrive and develop. A mapping of "high nature value forests" will be carried out (2016-2018) and will form the basis for a more focused protection of the nature values in forests.

²² Note : this is the share in 2010.

Country tables: Finland

Indicator		Context parameter	Unit	Value
1.1	Forest area	Area of forest as % of total land area (forest cover)	%	73.1
1.1	Forest area	Forest/population ratio (ha of forest/head of population)	ha/head	4.08
1.2	Growing stock	Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	107.9
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of FOWL, €/ha/year of FOWL	€/ha/year FOWL	2.3
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	€/ha	No data
4.3	Naturalness	Share of forest undisturbed by man in forest	%	1.0
4.3	Naturalness	Share of plantations in forest	%	30.5
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL	%	0.1
6.1	Forest holdings	Share of publicly owned forest, most recent period	%	30.4
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	%	No data
6.2	Contribution of forest sector to GDP	Share of GDP taken by forestry, most recent period	%	1.78
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods	€/ha	No data
6.5	Forest sector workforce	Forestry labour force as % of total workforce	%	0.93
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	3.63
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ RE), most recent 3-year average	%	-249.08
6.9	Energy from wood resources	Share of wood in total primary energy supply	%	21.9
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes in total wood biomass removals	%	22.8

Policy and institutions (qualitative indicators)

Indicator		Context parameter	Unit	Value
A1	National forest programmes or similar	Starting date of national forest programme or similar	Year	1993
A1	National forest programmes or similar	Type of national forest programme	Type	Formal
A2	Institutional framework	Number of staff who formulate and administer forest policy and law	Number/1,000,000 ha of forest	5.4
A3	Legal regulatory framework and international commitments	Date of enactment of forest law	Year	1997
A3	Legal regulatory framework and international commitments	Date of most recent amendment of forest law	Year	2013
A3	Legal regulatory framework and international commitments	Date of most recent formal statement of forest policy	Year	2014
A4	Financial instruments/economic policy	Total official transfer payments/subsidies	€/ha/year of private forest	9.75
A4	Financial instruments/economic policy	Payment from public budget to state forest organisation	€/ha/year of public forest	5.00
A4	Financial instruments/economic policy	Public expenditure on research, education and training per hectare of forest	€/ha/year	2.00
A5	Informational means	Existence of a formal communication and outreach strategy	Yes/No	Yes

Indicator		Assessment parameter	Unit	Threshold	Value
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	0.03
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	-0.3
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	0.46
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication 2010	%	>80%	41
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	1.31
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	0.28
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	0.023
3.1	Increment and felling	Ratio felling/NAI on FAWS, most recent ten-year period, in %	%	>100%	79.5
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha/year	<€10/ha/year	96.99
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	95.1
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Change in %	Any negative change, compared to previous period	4.7
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Change in %	Any decrease	-6.63
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Change in %	Any increase	0.00
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Change in m ³ /ha	Any decrease	-0.1
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	16.1
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	12.0
5.1 & 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	-347
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha/year	< €5/ha/year	93.14
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	No data
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	100

Discussion of parameters for which the threshold was exceeded

Parameter	Threshold	Value	Are data accurate?	Background and context	Policy response
1.1 Annual average percent change in area of forest available for wood supply in most recent ten-year period	Any decrease	-0.30%	Yes	New protection areas have been established for protection of biodiversity. This has led to a decrease in FAWS. Because cuttings are about 80% of the sustainable cutting level, this decrease is not a problem nationally. Locally, reduction of FAWS has caused decrease in revenue from forests.	Development is in accordance with forest protection policies, trend is continuing. Threshold not relevant to Finnish conditions
4.2 Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Any decrease	-6.63%	Yes	Threshold not meaningful, as natural regeneration is not possible on all sites. In past years, spruce forests have been regenerated increasingly. In many cases, natural regeneration in spruce forests results in poor quality seedling stands.	NR is widely applied but it is up to each forest owner to decide which is more applicable Threshold not relevant to Finnish conditions
4.5 Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Any decrease	-0.1%	No	Volume of dead wood has increased in South Finland, where it is markedly lower than in the North. Therefore, the trend is positive in South. The slightly negative trend in the North is probably caused by measurement differences (between different inventories) because we have also observed negative trend in protected forests	The result is surprising when compared to new forest management practices, under taken in past 10 – 15 years. The new forest management guidelines recommend leaving dead wood in cuttings untouched and leaving remnant trees in regeneration cuttings. These requirements are also both in the FSC and PEFC forest certification criteria.
5.1 Change in area of forest designated as having protective functions (5.1+5.2)	Any decrease	-347ha	No	Part of the protective forests has moved to the category protected forests. Also there are some difficulties in the interpretation of definitions. Data on protective forests are not of good quality.	When protective forest has moved to protected forest, protective function of the forest is still maintained.
6.6 Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Increase in accident rate and/or lack of information on accident rates	No data supplied		Data on accidents is available, but not according to the given definitions. No comment received	

Country tables: France

Indicator		Context parameter	Unit	Value
1.1	Forest area	Area of forest as % of total land area (forest cover)	%	31
1.1	Forest area	Forest/population ratio (ha of forest/head of population)	ha/head	0.26
1.2	Growing stock	Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	168.4
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of FOWL, €/ha/year of FOWL	€/ha/year FOWL	3.1
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	€/ha	3.5
4.3	Naturalness	Share of forest undisturbed by man in forest	%	0.0
4.3	Naturalness	Share of plantations in forest	%	11.6
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL	%	8.4
6.1	Forest holdings	Share of publicly owned forest, most recent period	%	24.7
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	%	No data
6.2	Contribution of forest sector to GDP	Share of GDP taken by forestry, most recent period	%	0.12
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods	€/ha	31
6.5	Forest sector workforce	Forestry labour force as % of total workforce	%	0.12
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	1.37
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ RE), most recent 3-year average	%	9.16
6.9	Energy from wood resources	Share of wood in total primary energy supply	%	3.6
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes in total wood biomass removals	%	55.2

Policy and institutions (qualitative indicators)

Indicator		Context parameter	Unit	Value
A1	National forest programmes or similar	Starting date of national forest programme or similar	Year	2006
A1	National forest programmes or similar	Type of national forest programme	Type	Formal
A2	Institutional framework	Number of staff who formulate and administer forest policy and law	Number/1,000,000 ha of forest	24.3
A3	Legal regulatory framework and international commitments	Date of enactment of forest law	Year	1827
A3	Legal regulatory framework and international commitments	Date of most recent amendment of forest law	Year	2012/2014
A3	Legal regulatory framework and international commitments	Date of most recent formal statement of forest policy	Year	2006
A4	Financial instruments/economic policy	Total official transfer payments/subsidies	€/ha/year of private forest	No data
A4	Financial instruments/economic policy	Payment from public budget to state forest organisation	€/ha/year of public forest	47.60
A4	Financial instruments/economic policy	Public expenditure on research, education and training per hectare of forest	€/ha/year	1.60
A5	Informational means	Existence of a formal communication and outreach strategy	Yes/No	Yes

Indicator		Assessment parameter	Unit	Threshold	Value
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	0.69
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	0.53
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	1.27
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication 2010	%	>80%	84
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	1.12
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	No data
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	0.110
3.1	Increment and fellings	Ratio fellings/NAI on FAWS, most recent ten-year period, in %	%	>100%	47.3
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha/year	<€10/ha/year	104.61
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	44.8
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Change in %	Any negative change, compared to previous period	1.9
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Change in %	Any decrease	No data
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Change in %	Any increase	No data
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Change in m ³ /ha	Any decrease	
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	No data
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	3.6
5.1 & 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	0.6
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha/year	< €5/ha/year	No data
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	62.61
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	-19.02

Discussion of parameters for which the thresholds have been exceeded

Parameter		Warning level	Value recorded initially	Are data accurate?	Background and context	Policy response
2.1	Percentage of natural ecosystem area at risk of eutrophication 2010	>80%	84%	No comment from national correspondent		
3.5	Percentage of FOWL under formal management plan or equivalent	<50%	44.8%	This figure does not include "equivalent" instruments, which, if included, would change the picture considerably.	In France, all felling is subject to administrative approval. The area under formal management plans is steadily increasing	
4.9	Area of forest strictly protected for conservation of biodiversity as % of total forest	<3%	0.6%	The definitions of all conservation classes have been strictly observed	The percentage "strictly" protected depends on how the French classes of protection are interpreted: that share is 21% if class 1.3 is included. In France, class 1.3 has a high degree of protection. The question of classification deserves an in-depth discussion between countries.	
6.10	Area accessible for recreation as % of area of FOWL, most recent year	<85%	25%	The percentage refers to public forests. In private forests (75% of the total), there is no legal right of access, although, in practice, most of these forests are accessible, and used for recreation. Accessibility is not an issue in France		

Country tables: Germany

Indicator		Context parameter	Unit	Value
1.1	Forest area	Area of forest as % of total land area (forest cover)	%	32.8
1.1	Forest area	Forest/population ratio (ha of forest/head of population)	ha/head	0.14
1.2	Growing stock	Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	320.8
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of FOWL, €/ha/year of FOWL	€/ha/year FOWL	73.6
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	€/ha	No data
4.3	Naturalness	Share of forest undisturbed by man in forest	%	0.0
4.3	Naturalness	Share of plantations in forest	%	0.0
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL	%	1.9
6.1	Forest holdings	Share of publicly owned forest, most recent period	%	52.0
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	%	No data
6.2	Contribution of forest sector to GDP	Share of GDP taken by forestry, most recent period	%	0.11
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods	€/ha	No data
6.5	Forest sector workforce	Forestry labour force as % of total workforce	%	0.11
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	1.71
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ RE), most recent 3-year average	%	-0.01
6.9	Energy from wood resources	Share of wood in total primary energy supply	%	4.3
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes in total wood biomass removals	%	56.4

Policy and institutions (qualitative indicators)

Indicator		Context parameter	Unit	Value
A1	National forest programmes or similar	Starting date of national forest programme or similar	Year	No data
A1	National forest programmes or similar	Type of national forest programme	Type	No data
A2	Institutional framework	Number of staff who formulate and administer forest policy and law	Number/1,000,000 ha of forest	No data
A3	Legal regulatory framework and international commitments	Date of enactment of forest law	Year	No data
A3	Legal regulatory framework and international commitments	Date of most recent amendment of forest law	Year	No data
A3	Legal regulatory framework and international commitments	Date of most recent formal statement of forest policy	Year	No data
A4	Financial instruments/economic policy	Total official transfer payments/subsidies	€/ha/year of private forest	No data
A4	Financial instruments/economic policy	Payment from public budget to state forest organisation	€/ha/year of public forest	No data
A4	Financial instruments/economic policy	Public expenditure on research, education and training per hectare of forest	€/ha/year	No data
A5	Informational means	Existence of a formal communication and outreach strategy	Yes/No	Yes

Indicator		Assessment parameter	Unit	Threshold	Value
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	0.03
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	0.02
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	0.44
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication 2010	%	>80%	54
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	1.12
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	No data
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	0.004
3.1	Increment and fellings	Ratio fellings/NAI on FAWS, most recent ten-year period, in %	%	>100%	78.5
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha/year	<€10/ha/year	325.56
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	66.0
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Change in %	Any negative change, compared to previous period	No data
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Change in %	Any decrease	1.31
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Change in %	Any increase	0.00
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Change in m ³ /ha	Any decrease	-3.1
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	8.8
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	1.9
5.1 & 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	1,635
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha/year	< €5/ha/year	115.66
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	-570 ²³
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	95

²³ Number of non-fatal accidents. Data not available on total workers, so this is the change in the absolute number of accidents, not the change in the accident rate

Discussion of parameters for which the threshold was exceeded

Parameter	Threshold	Value	Are data accurate?	Background and context	Policy response
4.5 Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Any decrease	-3.1%	The value for 2000 comes from the NFI 2002 with a survey threshold of 20 cm at the thinner end. The value for 2005 comes from the inventory study 2008, and the value for 2010 from the NFI 2012. The values for 2005 and later have a survey threshold of 10 cm at the thinner end. More deadwood was recorded as a result of this. The increase in values between 2002 and 2008 can therefore be explained by methodological reasons. With 8x8 km, the value for 2005 from the inventory study 2008 is based on a grid that is significantly thinner than the NFI grid. For this reason, at national level, only changes between NFI 2002 and NFI 2012 were calculated. These calculations show an increase. The changed survey threshold was taken into account in these calculations.	The deadwood level is assessed as high. It exceeds the expectations we had before the inventory was conducted. The deadwood level varies because it is essentially based on windthrow which occurs only episodically. Decay, on the other hand, is a very continuous process. Variations, including decreases, must therefore be accepted. The tolerance threshold is rejected.	None, as deadwood increased between NFI 2 and NFI 3, and also because of the facts explained under "Background". In addition, the deadwood programmes launched by the federal states over the past years will only produce effects over the long term.
4.9 Area of forest strictly protected for conservation of biodiversity as % of total forest	<3%	1.9%	The value is subject to current research activities and inter-ministerial consultation.	The survey threshold for protected areas is still being discussed between different ministries.	Another research project is currently under way (follow-up project to the NWE5 project conducted by the Federal Agency for Nature Conservation/BfN).

Country tables: Hungary

Indicator		Context parameter	Unit	Value
1.1	Forest area	Area of forest as % of total land area (forest cover)	%	22.2
1.1	Forest area	Forest/population ratio (ha of forest/head of population)	ha/head	0.21
1.2	Growing stock	Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	185.9
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of FOWL, €/ha/year of FOWL	€/ha/year FOWL	No data
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	€/ha	No data
4.3	Naturalness	Share of forest undisturbed by man in forest	%	0.0
4.3	Naturalness	Share of plantations in forest	%	40.4
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL	%	42
6.1	Forest holdings	Share of publicly owned forest, most recent period	%	57.6
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	%	9.5
6.2	Contribution of forest sector to GDP	Share of GDP taken by forestry, most recent period	%	0.23
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods	€/ha	No data
6.5	Forest sector workforce	Forestry labour force as % of total workforce	%	0.43
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	0.84
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ RE), most recent 3-year average	%	13.96
6.9	Energy from wood resources	Share of wood in total primary energy supply	%	3.6
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes in total wood biomass removals	%	No data

Policy and institutions (qualitative indicators)

Indicator		Context parameter	Unit	Value
A1	National forest programmes or similar	Starting date of national forest programme or similar	Year	2007
A1	National forest programmes or similar	Type of national forest programme	Type	Formal
A2	Institutional framework	Number of staff who formulate and administer forest policy and law	Number/1,000,000 ha of forest	236.8
A3	Legal regulatory framework and international commitments	Date of enactment of forest law	Year	2009
A3	Legal regulatory framework and international commitments	Date of most recent amendment of forest law	Year	No data
A3	Legal regulatory framework and international commitments	Date of most recent formal statement of forest policy	Year	2004
A4	Financial instruments/economic policy	Total official transfer payments/subsidies	€/ha/year of private forest	62.85
A4	Financial instruments/economic policy	Payment from public budget to state forest organisation	€/ha/year of public forest	112.20
A4	Financial instruments/economic policy	Public expenditure on research, education and training per hectare of forest	€/ha/year	5.40
A5	Informational means	Existence of a formal communication and outreach strategy	Yes/No	No

Indicator		Assessment parameter	Unit	Threshold	Value
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	0.42
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	0.55
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	0.88
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication 2010	%	>80%	100
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	1.42
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	8.09
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	0.064
3.1	Increment and fellings	Ratio fellings/NAI on FAWS, most recent ten-year period, in %	%	>100%	80.0
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha/year	<€10/ha/year	No data
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	100.0
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Change in %	Any negative change, compared to previous period	1.5
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Change in %	Any decrease	0.08
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Change in %	Any increase	2.84
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Change in m ³ /ha	Any decrease	No data
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	17.0
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	0.6
5.1 & 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	-20
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha/year	< €5/ha/year	75.12
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	-0.85
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	98

Discussion of parameters for which the threshold was exceeded

(For layout reasons, some extensive comments are shown below the table)

	Parameter	Threshold	Value	Are data accurate?	Background and context	Policy response
2.1	Percentage of natural ecosystem area at risk of eutrophication for an emission scenario based on current legislation	>80%	100%	The data was provided by international data providers, therefore I do not want to comment the outcome.	Based on our national monitoring of depositions – Hungary is a member of the ICP Forests monitoring system – I do not consider this 100% relevant to Hungary.	NA
2.4	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	>5%	8.09%	The area with forest damage has really increased in the last 30 years. However damage area may vary annually significantly. I do not believe, that forest management has become unsustainable due to these events. Therefore the 5% threshold may not be applicable in general, and a more careful analysis of the situation is advised. See below		Close to nature forest management is recommended. See below
4.4	Change in share of invasive species, most recent 10 year period, %	Any increase	2.84%		Black locust (<i>Robinia pseudoacacia</i>) is historically important tree species in Hungary, and is widely planted to increase forest area See below	Depending on the natural value of the sites and the primary goal of forest management, differentiated regulations and guidelines on black locust management were developed and are applied.
4.9	Area of forest strictly protected for conservation of biodiversity as % of total forest	<3%	0.6%		These two categories of strictly protected areas may not be informative enough to characterize the sustainability of biodiversity management in forests. Though the proportion of these categories is not high in Hungary, nearly 25% of the forest area is devoted to nature conservation, in addition more than 40% of the forest are under NATURA 2000. When sustainability is characterised, other protection categories and their characteristics/management are also advised to be considered	
5.1 and 5.2	Change in area of forest designated as having protective functions (5.1+5.2)	Decrease	-20%	The decline is due to reclassification as protected forests for biodiversity. The soil and water protection functions are still maintained in the new classification. See below	Sustainability of the protective functions of our forests is guaranteed even though this is not clearly reflected in the statistics. See below.	

2.4 Forest damage

Background and context: The area with forest damage has really increased in the last 30 years. However damage area – as in several other countries – may vary annually significantly. Just an example: The damage caused by gipsy moth (*Lymantria dispar*) was around 300, 000 hectares in 2005 (more than 15% of forest area) but after three years no significant damage was recorded. The extreme damage (ten times larger area ever recorded) was related to the dry and hot weather – possible effect of climate change. I do not believe, that forest management has become unsustainable due to these events. Therefore the 5% threshold may not be applicable in general, and a more careful analysis of the situation is advised.

Policy response: Close to nature forest management methods are preferred in native stands to increase the resistance of forest stands against damages. Predictions of foreseen effects of climate change on forestry and the elaboration of a decision support system to forest managers to support adaptation to climate change is under elaboration

4.4 Invasive species

Background and context: Black locust (*Robinia pseudoacacia*) is historically important tree species in Hungary. A century ago widely planted on poor sites for soil protection (shifting sand), later as fast growing hardwood, it was an important species to increase the forest cover of Hungary (that had dropped to 11% after the first World War). Up to now the tree is favoured by the rural population, and was dedicated to be “Hungaricum” the special national value, characteristic to Hungary. While the tree species is not favoured and even eradicated on forest sites with special natural value, the black locust is widely planted in afforestations to increase the forest area in Hungary.

5.1 and 5.2 Protective functions

Background and context: The area of protective forests was around 200,000 hectares in 1990 and at the same time the area of protected forests (according to the national category) was around 60,000 hectares. The area of protected forests increased to 450,000 hectares by 2014. Forest area devoted to biodiversity protection increased to seven times larger in the last 35 years. In this process large forest areas devoted to soil or water protection were re-categorized to serve nature conservation as a primary goal, therefore the area of protective forest decreased. Soil or water protection are also considered in the management of these re-classified areas, however in the statistics it seems to be a negative tendency. New protective forests have also been dedicated, though the area is not big enough to compensate the results of the above described re-classification

Policy response: Moreover, I believe, that the decrease of the area of protective forests may not necessarily result the decrease of the importance and fulfilment of these functions and the lack of sustainable forest management. It can be a result of new research findings, modification of priorities (like in Hungary), protective function may lose importance on a particular site or some forest may not support any more the protective purpose effectively.

Country tables: Ireland

Indicator		Context parameter	Unit	Value
1.1	Forest area	Area of forest as % of total land area (forest cover)	%	10.9
1.1	Forest area	Forest/population ratio (ha of forest/head of population)	ha/head	0.16
1.2	Growing stock	Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	133.6
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of FOWL, €/ha/year of FOWL	€/ha/year FOWL	No data
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	€/ha	No data
4.3	Naturalness	Share of forest undisturbed by man in forest	%	0.0
4.3	Naturalness	Share of plantations in forest	%	90.6
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL	%	45.4
6.1	Forest holdings	Share of publicly owned forest, most recent period	%	53.2
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	%	21.6
6.2	Contribution of forest sector to GDP	Share of GDP taken by forestry, most recent period	%	0.12
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods	€/ha	169
6.5	Forest sector workforce	Forestry labour force as % of total workforce	%	0.13
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	0.66
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ RE), most recent 3-year average	%	-0.30
6.9	Energy from wood resources	Share of wood in total primary energy supply	%	1.1
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes in total wood biomass removals	%	8.7

Policy and institutions (qualitative indicators)

Indicator		Context parameter	Unit	Value
A1	National forest programmes or similar	Starting date of national forest programme or similar	Year	2014
A1	National forest programmes or similar	Type of national forest programme	Type	Formal
A2	Institutional framework	Number of staff who formulate and administer forest policy and law	Number/1,000,000 ha of forest	110.00
A3	Legal regulatory framework and international commitments	Date of enactment of forest law	Year	1946
A3	Legal regulatory framework and international commitments	Date of most recent amendment of forest law	Year	2014
A3	Legal regulatory framework and international commitments	Date of most recent formal statement of forest policy	Year	2014
A4	Financial instruments/economic policy	Total official transfer payments/subsidies	€/ha/year of private forest	334.10
A4	Financial instruments/economic policy	Payment from public budget to state forest organisation	€/ha/year of public forest	8.95
A4	Financial instruments/economic policy	Public expenditure on research, education and training per hectare of forest	€/ha/year	No data
A5	Informational means	Existence of a formal communication and outreach strategy	Yes/No	No

Indicator		Assessment parameter	Unit	Threshold	Value
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	0.87
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	2.88
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	81
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication 2010	%	>80%	1.18
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	No data
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	0.090
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	52.5
3.1	Increment and fellings	Ratio fellings/NAI on FAWS, most recent ten-year period, in %	%	>100%	No data
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha/year	<€10/ha/year	72.4
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	No data
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Change in %	Any negative change, compared to previous period	-3.13
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Change in %	Any decrease	0
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Change in %	Any increase	
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Change in m ³ /ha	Any decrease	1.0
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	0
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	No data
5.1 & 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	No data
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha/year	< €5/ha/year	No data
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	-2.75
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	56

Discussion of parameters for which the threshold was exceeded

Parameter	Threshold	Value	Are data accurate?	Background and context	Policy response
2.1 Percentage of natural ecosystem area at risk of eutrophication for an emission scenario based on current legislation	>80%	81%	This information was derived from a broader study, and the forest sector correspondent was not able to verify it.	The correspondent considered forests are not being affected by eutrophication in Ireland.	
4.2 Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Any decrease	-3.13%	The data is supplied from a plot classification in the NFI, which could be a little subjective.	In the view of the national correspondent, there are no underlying issues here other than measurement error in the field.	NA
4.8 Number of threatened forest tree species as % of total forest tree species	lack of information on parameter	Low	It is estimated that there is only one threatened forest tree species in Ireland ("vulnerable"). However the total number of forest tree species is not known precisely. Thus the percentage of threatened species is not precisely known, but is low		NA
6.10 Area accessible for recreation as % of area of FOWL, most recent year	<85%	56%	This is "Area with access available to the public for recreational purposes" The area available to recreation has been more or less static since 2000. The % of the total forest area available for recreation is decreasing because the public forest estate area is not increasing but the private estate is increasing	Forest recreation is predominantly a feature of the public forest estate, which is completely open to the public. The private estate is generally not open to the general public to access. Also, due to the fragmented nature and small size of forest blocks in the private estate it is not as conducive to recreation.	Irish people have not seen any reduction in areas open to recreation. If anything the situation has improved due to significant investment in this area by the exchequer (Neighbourwood Scheme https://www.agriculture.gov.ie/media/migration/forestry/publications/NeighbourWoodScheme120712.pdf) and the public forest company (http://www.coillteoutdoors.ie/home/)

Country tables: Latvia

Indicator		Context parameter	Unit	Value
1.1	Forest area	Area of forest as % of total land area (forest cover)	%	54.0
1.1	Forest area	Forest/population ratio (ha of forest/head of population)	ha/head	1.67
1.2	Growing stock	Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	195.5
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of FOWL, €/ha/year of FOWL	€/ha/year FOWL	3.9
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	€/ha	8.3
4.3	Naturalness	Share of forest undisturbed by man in forest	%	0.5
4.3	Naturalness	Share of plantations in forest	%	0.3
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL	%	0.1
6.1	Forest holdings	Share of publicly owned forest, most recent period	%	52.3
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	%	26.6
6.2	Contribution of forest sector to GDP	Share of GDP taken by forestry, most recent period	%	3.30
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods	€/ha	No data
6.5	Forest sector workforce	Forestry labour force as % of total workforce	%	1.97
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	2.37
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ RE), most recent 3-year average	%	-155.23
6.9	Energy from wood resources	Share of wood in total primary energy supply	%	26.6
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes in total wood biomass removals	%	No data

Policy and institutions (qualitative indicators)

Indicator		Context parameter	Unit	Value
A1	National forest programmes or similar	Starting date of national forest programme or similar	Year	2006
A1	National forest programmes or similar	Type of national forest programme	Type	Formal
A2	Institutional framework	Number of staff who formulate and administer forest policy and law	Number/1,000,000 ha of forest	211.25
A3	Legal regulatory framework and international commitments	Date of enactment of forest law	Year	2000
A3	Legal regulatory framework and international commitments	Date of most recent amendment of forest law	Year	2011
A3	Legal regulatory framework and international commitments	Date of most recent formal statement of forest policy	Year	1998
A4	Financial instruments/economic policy	Total official transfer payments/subsidies	€/ha/year of private forest	No data
A4	Financial instruments/economic policy	Payment from public budget to state forest organisation	€/ha/year of public forest	No data
A4	Financial instruments/economic policy	Public expenditure on research, education and training per hectare of forest	€/ha/year	No data
A5	Informational means	Existence of a formal communication and outreach strategy	Yes/No	No

Indicator		Assessment parameter	Unit	Threshold	Value
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	0.18
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	0.20
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	1.79
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication 2010	%	>80%	99
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	1.02
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	0.26
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	0.002
3.1	Increment and fellings	Ratio fellings/NAI on FAWS, most recent ten-year period, in %	%	>100%	76.5
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha/year	<€10/ha/year	144.5
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	88.6
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Change in %	Any negative change, compared to previous period	No data
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Change in %	Any decrease	3.15
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Change in %	Any increase	0.00
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Change in m ³ /ha	Any decrease	5.8
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	12
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	5.8
5.1 & 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	60
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha/year	< €5/ha/year	48.1
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	-1.32
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	93

Discussion of parameters for which the threshold was exceeded

	Parameter	Threshold	Value	Are data accurate?	Background and context	Policy response
2.1	Percentage of natural ecosystem area at risk of eutrophication for an emission scenario based on current legislation	>80%	99%		We don't have information on methodology how the value of indicator 2.1. was obtained. We consulted our expert and concluded that the problem could be in figures which were used to calculate the value.	

Country tables: Lithuania

	Indicator	Context parameter	Unit	Value
1.1	Forest area	Area of forest as % of total land area (forest cover)	%	34.8
1.1	Forest area	Forest/population ratio (ha of forest/head of population)	ha/head	0.74
1.2	Growing stock	Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	221.6
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of FOWL, €/ha/year of FOWL	€/ha/year FOWL	7.5
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	€/ha	No data
4.3	Naturalness	Share of forest undisturbed by man in forest	%	1.2
4.3	Naturalness	Share of plantations in forest	%	0.0
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL	%	0.1
6.1	Forest holdings	Share of publicly owned forest, most recent period	%	61.4
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	%	62.0
6.2	Contribution of forest sector to GDP	Share of GDP taken by forestry, most recent period	%	0.50
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods	€/ha	-13
6.5	Forest sector workforce	Forestry labour force as % of total workforce	%	0.71
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	1.94
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ RE), most recent 3-year average	%	-10.13
6.9	Energy from wood resources	Share of wood in total primary energy supply	%	12.5
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes in total wood biomass removals	%	31.6

Policy and institutions (qualitative indicators)

Lithuania did not submit a report on qualitative indicators in the context of the Pan-European reporting 2015.

Indicator		Assessment parameter	Unit	Threshold	Value
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	0.27
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	0.27
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	0.49
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication 2010	%	>80%	100
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	1.72
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	4.38
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	0.014
3.1	Increment and felling	Ratio fellings/NAI on FAWS, most recent ten-year period, in %	%	>100%	82.9
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha/year	<€10/ha/year	136
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	100.0
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Change in %	Any negative change, compared to previous period	No data ²⁴
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Change in %	Any decrease	-1.63
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Change in %	Any increase	0.00
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Change in m ³ /ha	Any decrease	0.0
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	0.0
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	5.1
5.1 & 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	16
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha/year	< €5/ha/year	43.09
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	-0.2
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	99

²⁴ Forest stand area with 6 and more tree species increased from 6.7% (2000) to 7.5% (2010).

Discussion of parameters for which the threshold was exceeded

Parameter	Threshold	Value	Are data accurate?	Background and context	Policy response
2.1 Percentage of natural ecosystem area at risk of eutrophication for an emission scenario based on current legislation	>80%	100%	These data result from a study carried out by ICP EMEP modeling depositions and critical levels, which was reported in SoEF 2011, but has several shortcomings and has not been repeated. The national correspondent considered these values of low quality and not representative of the situation in Lithuania.	The health and vitality of Lithuanian forests are generally considered satisfactory (see for instance indicator 2.2), and this result is not considered to give a correct impression of the health and vitality of the forests.	NA
4.2 Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Any decrease	-1.63%	There is uncertainty about the definition of the indicator.	The share of natural regeneration is strongly influenced by the particular circumstances of the country. In Lithuania, planting is considered to accelerate stand establishment, and reduce the time without tree cover after harvesting. Even in planted stands, there are often several different species.	NA

Country tables: Norway

Indicator		Context parameter	Unit	Value
1.1	Forest area	Area of forest as % of total land area (forest cover)	%	39.8
1.1	Forest area	Forest/population ratio (ha of forest/head of population)	ha/head	2.38
1.2	Growing stock	Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	125.1
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of FOWL, €/ha/year of FOWL	€/ha/year FOWL	1.1
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	€/ha	4.9
4.3	Naturalness	Share of forest undisturbed by man in forest	%	1.3
4.3	Naturalness	Share of plantations in forest	%	1.0
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL	%	0.5
6.1	Forest holdings	Share of publicly owned forest, most recent period	%	12.3
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	%	2.5
6.2	Contribution of forest sector to GDP	Share of GDP taken by forestry, most recent period	%	0.22
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods	€/ha	3
6.5	Forest sector workforce	Forestry labour force as % of total workforce	%	0.15
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	2.31
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ RE), most recent 3-year average	%	-29.26
6.9	Energy from wood resources	Share of wood in total primary energy supply	%	4.2
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes in total wood biomass removals	%	22.5

Policy and institutions (qualitative indicators)

Indicator		Context parameter	Unit	Value
A1	National forest programmes or similar	Starting date of national forest programme or similar	Year	1998
A1	National forest programmes or similar	Type of national forest programme	Type	Guided, similar
A2	Institutional framework	Number of staff who formulate and administer forest policy and law	Number/1,000,000 ha of forest	No data
A3	Legal regulatory framework and international commitments	Date of enactment of forest law	Year	2006
A3	Legal regulatory framework and international commitments	Date of most recent amendment of forest law	Year	2014
A3	Legal regulatory framework and international commitments	Date of most recent formal statement of forest policy	Year	No data
A4	Financial instruments/economic policy	Total official transfer payments/subsidies	€/ha/year of private forest	4.35
A4	Financial instruments/economic policy	Payment from public budget to state forest organisation	€/ha/year of public forest	28.25
A4	Financial instruments/economic policy	Public expenditure on research, education and training per hectare of forest	€/ha/year	No data
A5	Informational means	Existence of a formal communication and outreach strategy	Yes/No	No

Indicator		Assessment parameter	Unit	Threshold	Value
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	0.02
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	-0.16
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	1.47
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication 2010	%	>80%	14
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	No data
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	No data
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	No data
3.1	Increment and felling	Ratio felling/NAI on FAWS, most recent ten-year period, in %	%	>100%	46.4
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha/year	<€10/ha/year	53.20
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	27.9
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Change in %	Any negative change, compared to previous period	No data
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Change in %	Any decrease	-1.15
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Change in %	Any increase	0.00
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Change in m ³ /ha	Any decrease	2.6
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	0
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	3.5
5.1 & 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	0
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha/year	< €5/ha/year	-0.02
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	-2.30
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	100

Discussion of parameters for which the threshold was exceeded

Parameter	Threshold	Value	Are data accurate?	Background and context	Policy response
1.1 Annual average percent change in area of forest available for wood supply in most recent ten-year period	Any negative change	-0.16%	The total forest area is in general expected to be rather stable, or slowly increasing. The small fluctuations reflected in the data may to some extent be caused by changes in inventory methodology. It is, however, likely that there is a minor, decreasing trend in the area of FAWS	The reduction in FAWS is mainly due to increased protection of forests (see indicator 4.9). Expansion of urban areas, building of new roads etc. may also have contributed to this.	Not considered to be an issue of concern.
3.5 Forests under management plan	<50%	27.9%	The data are likely to be reasonably correct, taking into account that the statistics only include areas assessed after the introduction of a new planning system in 2001. Areas with plans prepared before 2001 have not been included, although some of these may still have relevance to forest management in 2010.	Only FAWS is considered relevant for management plans for production. The forest area with some significance for wood production is even lower, an estimated 6-6.5 million ha. It is not mandatory for forest owners to have a management plan. There are many small farm forests, and they may be well managed even without a formal management plan.	Not considered to be an issue of concern.
4.2 Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Any decrease	-1.15%	The data are likely to be reasonably correct.	Annual planted area decreased significantly from the early 1990s to about 2005; since then planting activities have increased slowly again. It has not been a goal for forest authorities to reduce planting, rather the opposite, in order to secure sufficient regeneration after harvesting. The increasing trend in planting is likely to be a result of the authorities' efforts to do so.	It has been an issue of concern to increase planting, and a number of measures have been introduced. E.g. a system has been implemented for checking whether forest owners buy forest plants after harvesting timber.
6.3 Net entrepreneurial revenue per hectare, most recent period	< €5/ha/year	-0.02	The basic economic data reported by Statistics Norway revealed no exceptional values for the reference year 2010, compared to previous years.	The timber harvest and timber prices were at a particular low level in 2009, compared to those in both previous and later years. It is possible that this may have influenced the net entrepreneurial income for 2010, if the costs have been kept constant in the accounting procedures	

Country tables: Romania

Indicator		Context parameter	Unit	Value
1.1	Forest area	Area of forest as % of total land area (forest cover)	%	29.2
1.1	Forest area	Forest/population ratio (ha of forest/head of population)	ha/head	0.35)
1.2	Growing stock	Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	279.5
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of FOWL, €/ha/year of FOWL	€/ha/year FOWL	1.9
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	€/ha	No data
4.3	Naturalness	Share of forest undisturbed by man in forest	%	4.1
4.3	Naturalness	Share of plantations in forest	%	8.3
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL	%	6.3
6.1	Forest holdings	Share of publicly owned forest, most recent period	%	67
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	%	No data
6.2	Contribution of forest sector to GDP	Share of GDP taken by forestry, most recent period	%	0.4
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods	€/ha	5
6.5	Forest sector workforce	Forestry labour force as % of total workforce	%	0.58
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	0.68
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ RE), most recent 3-year average	%	-33.14
6.9	Energy from wood resources	Share of wood in total primary energy supply	%	10.3
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes in total wood biomass removals	%	No data

Policy and institutions (qualitative indicators)

Indicator		Context parameter	Unit	Value
A1	National forest programmes or similar	Starting date of national forest programme or similar	Year	2014
A1	National forest programmes or similar	Type of national forest programme	Type	National Forest Strategy 2014-2023 in public consultation
A2	Institutional framework	Number of staff who formulate and administer forest policy and law	Number/1,000,000 ha of forest	62.1
A3	Legal regulatory framework and international commitments	Date of enactment of forest law	Year	Forest Code - Law 46, republished in 2015
A3	Legal regulatory framework and international commitments	Date of most recent amendment of forest law	Year	2008
A3	Legal regulatory framework and international commitments	Date of most recent formal statement of forest policy	Year	2014
A4	Financial instruments/economic policy	Total official transfer payments/subsidies	€/ha/year of private forest	0.23
A4	Financial instruments/economic policy	Payment from public budget to state forest organisation	€/ha/year of public forest	No data
A4	Financial instruments/economic policy	Public expenditure on research, education and training per hectare of forest	€/ha/year	0.47
A5	Informational means	Existence of a formal communication and outreach strategy	Yes/No	Yes

Indicator		Assessment parameter	Unit	Threshold	Value
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	0.71
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	-0.87
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	1.93
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication 2010	%	>80%	20
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	No data
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	22.52
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	0.021
3.1	Increment and fellings	Ratio fellings/NAI on FAWS, most recent ten-year period, in %	%	>100%	54.7
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha/year	<€10/ha/year	No data
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	84.3
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Change in %	Any negative change, compared to previous period	No data
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Change in %	Any decrease	0.01
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Change in %	Any increase	No data
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Change in m ³ /ha	Any decrease	No data
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	No data
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	3.4
5.1 & 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	78
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha/year	< €5/ha/year	18.43
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	-0.01
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	e

Discussion of parameters for which the threshold was exceeded

	Parameter	Threshold	Value	Are data accurate?	Background and context	Policy response
1.1	Annual average percent change in area of forest available for wood supply in most recent ten-year period	Any negative change	-0.87	The indicator Forest available for wood supply (1,000 ha), has been calculated for the years 2005, 2010 and 2015 as percentage resulting from the functional zoning determined in 2000, based on forest management plans. As no other new determination is in place, it seems that there was a mistake for 2015 as long as the forest area for 2015 was calculated by National Forest Inventory (being bigger than in 2010) and the percentage applied should be the same. So, the estimated value for FAWS for 2015 would be 5.42 million hectares instead of 4.63 million hectares.	No negative trend estimated (after adjustment)	National Forest Inventory (NFI) will offer more accurate information on FAWS, after forest roads vectorisation on maps has been carried out in order to take this economic factor into consideration (distance of the felling area to forest road determines logging profitability).
2.4	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	>5%	22.52	Figures for 2010 are provided by National Forest Inventory, using a different system of data collection than in previous reporting years.		National Forest Inventory (NFI) will offer such information
4.8	Number of threatened forest tree species as % of total forest tree species	lack of information on parameter	Lack of information			National Forest Inventory (NFI) will offer such information

Country tables: Serbia

Indicator		Context parameter	Unit	Value
1.1	Forest area	Area of forest as % of total land area (forest cover)	%	31.1
1.1	Forest area	Forest/population ratio (ha of forest/head of population)	ha/head	0.38
1.2	Growing stock	Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	153.7
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of FOWL, €/ha/year of FOWL	€/ha/year FOWL	10.8
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	€/ha	No data
4.3	Naturalness	Share of forest undisturbed by man in forest	%	0.04
4.3	Naturalness	Share of plantations in forest	%	7.9
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL	%	0.1
6.1	Forest holdings	Share of publicly owned forest, most recent period	%	50.9
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	%	98.7
6.2	Contribution of forest sector to GDP	Share of GDP taken by forestry, most recent period	%	No data
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods	€/ha	-0.45
6.5	Forest sector workforce	Forestry labour force as % of total workforce	%	0.31
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	1.44
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ RE), most recent 3-year average	%	16.58
6.9	Energy from wood resources	Share of wood in total primary energy supply	%	13.6
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes in total wood biomass removals	%	78.2

Policy and institutions (qualitative indicators)

Indicator		Context parameter	Unit	Value
A1	National forest programmes or similar	Starting date of national forest programme or similar	Year	2011
A1	National forest programmes or similar	Type of national forest programme	Type	Similar
A2	Institutional framework	Number of staff who formulate and administer forest policy and law	Number/1,000,000 ha of forest	10
A3	Legal regulatory framework and international commitments	Date of enactment of forest law	Year	2010
A3	Legal regulatory framework and international commitments	Date of most recent amendment of forest law	Year	2012
A3	Legal regulatory framework and international commitments	Date of most recent formal statement of forest policy	Year	2006
A4	Financial instruments/economic policy	Total official transfer payments/subsidies	€/ha/year of private forest	0.4
A4	Financial instruments/economic policy	Payment from public budget to state forest organisation	€/ha/year of public forest	No data
A4	Financial instruments/economic policy	Public expenditure on research, education and training per hectare of forest	€/ha/year	0.06
A5	Informational means	Existence of a formal communication and outreach strategy	Yes/No	No

Indicator		Assessment parameter	Unit	Threshold	Value
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	0.94
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	0.94
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	3.45
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication 2010	%	>80%	95
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	No data
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	2.99
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	0.033
3.1	Increment and felling	Ratio felling/NAI on FAWS, most recent ten-year period, in %	%	>100%	50.6
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha/year	<€10/ha/year	0.17
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	83
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Change in %	Any negative change, compared to previous period	No data
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Change in %	Any decrease	-1.41
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Change in %	Any increase	0
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Change in m ³ /ha	Any decrease	0.3
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	No data
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	4.8
5.1 & 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	12
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha/year	< €5/ha/year	No data
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	No data
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	100

Discussion of parameters for which the threshold was exceeded

The national correspondent checked the data, but was not able to respond on the accuracy and background questions. The table below presents those assessment parameters in Serbia whose value exceeded the agreed threshold. This does not imply that there is a cause for concern, as they have not been put in context by the national correspondent.

Parameter	Threshold	Value	Are data accurate?	Background and context	Policy response
2.1 Percentage of natural ecosystem area at risk of eutrophication for an emission scenario based on current legislation	>80%	95	(data taken from EEA study)		
3.2 Value of marketed roundwood, per hectare, 2012, €/ha of FAWS	<€10/ha	0.17			
4.2 Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Any decrease	-1.41			
6.6 Total fatal and non-fatal accidents per 1000 workers, change over two most recent reports (centred on 2005 and 2010)	Increase in accident rate and/or lack of information on accident rates	No data			

Country tables: Slovakia

Indicator		Context parameter	Unit	Value
1.1	Forest area	Area of forest as % of total land area (forest cover)	%	40.3
1.1	Forest area	Forest/population ratio (ha of forest/head of population)	ha/head	0.36
1.2	Growing stock	Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	246.3
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of FOWL, €/ha/year of FOWL	€/ha/year FOWL	4.6
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	€/ha	98.5
4.3	Naturalness	Share of forest undisturbed by man in forest	%	1.2
4.3	Naturalness	Share of plantations in forest	%	1.0
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL	%	2.9
6.1	Forest holdings	Share of publicly owned forest, most recent period	%	50.2
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	%	No data
6.2	Contribution of forest sector to GDP	Share of GDP taken by forestry, most recent period	%	0.33
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods	€/ha	13
6.5	Forest sector workforce	Forestry labour force as % of total workforce	%	0.82
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	1.21
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ RE), most recent 3-year average	%	-46.90
6.9	Energy from wood resources	Share of wood in total primary energy supply	%	4.9
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes in total wood biomass removals	%	14.5

Policy and institutions (qualitative indicators)

Indicator		Context parameter	Unit	Value
A1	National forest programmes or similar	Starting date of national forest programme or similar	Year	2006
A1	National forest programmes or similar	Type of national forest programme	Type	Formal
A2	Institutional framework	Number of staff who formulate and administer forest policy and law	Number/1,000,000 ha of forest	113.4
A3	Legal regulatory framework and international commitments	Date of enactment of forest law	Year	2005
A3	Legal regulatory framework and international commitments	Date of most recent amendment of forest law	Year	2014
A3	Legal regulatory framework and international commitments	Date of most recent formal statement of forest policy	Year	2007
A4	Financial instruments/economic policy	Total official transfer payments/subsidies	€/ha/year of private forest	19.60
A4	Financial instruments/economic policy	Payment from public budget to state forest organisation	€/ha/year of public forest	15.80
A4	Financial instruments/economic policy	Public expenditure on research, education and training per hectare of forest	€/ha/year	1.10
A5	Informational means	Existence of a formal communication and outreach strategy	Yes/No	No

Indicator		Assessment parameter	Unit	Threshold	Value
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	0.04
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	0.09
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	0.09
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication 2010	%	>80%	100
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	1.49
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	1.45
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	0.047
3.1	Increment and felling	Ratio felling/NAI on FAWS, most recent ten-year period, in %	%	>100%	67.2
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha/year	<€10/ha/year	180.33
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	100.0
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Change in %	Any negative change, compared to previous period	1.1
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Change in %	Any decrease	1.07
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Change in %	Any increase	0.40
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Change in m ³ /ha	Any decrease	No data
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	12.3
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	3.7
5.1 & 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	41
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha/year	< €5/ha/year	28.39
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	-1.82
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	94

Discussion of parameters for which the threshold was exceeded

Parameter	Threshold	Value	Are data accurate?	Background and context	Policy response	
2.1 Percentage of natural ecosystem area at risk of eutrophication for an emission scenario based on current legislation	>80%	100%		Information for this indicator is provided separately by IDP. So the information for Indicator 2.1 is not presented directly on a country basis. The real plot-level data show more positive results. The value of 100% of natural area at risk of eutrophication is due to spatial modelling of the data with very low resolution (very large pixel). In fact, the status of deposition of air pollutants in Slovakia is worse than in e.g. Scandinavian countries but better than in most countries of the Central and Western Europe.		
4.4 Change in share of invasive species, most recent 10 year period, %	Any increase	0.40%		The source data come from standwise forest inventory. They indicate a step-up change in the proportion of <i>Robinia pseudoacacia</i> between 2005 and 2010, with a little change between 2005 and 2010. This may be explained by the approach in the field forest inventories. Anyway, the reported difference of 10% in the invasive tree species is 8,000 ha, which is 0.8% of the forest area.	The spread and invasiveness of <i>Robinia pseudoacacia</i> is a matter of fact. It can be explained both by the extreme climate (drought), and the lower intensity of silvicultural interventions and little control of the invasive species in forestry.	No programme or policy for the control of invasive tree species was developed for forestry. Following the adoption of the EU Regulation 1143/2014 on invasive alien species, national policy and programme for invasive organisms has been under development

Country tables: Sweden

Indicator		Context parameter	Unit	Value
1.1	Forest area	Area of forest as % of total land area (forest cover)	%	68.4
1.1	Forest area	Forest/population ratio (ha of forest/head of population)	ha/head	2.93
1.2	Growing stock	Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	120.5
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of FOWL, €/ha/year of FOWL	€/ha/year FOWL	No data
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	€/ha	2.5
4.3	Naturalness	Share of forest undisturbed by man in forest	%	8.6
4.3	Naturalness	Share of plantations in forest	%	2.5
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL	%	1.7
6.1	Forest holdings	Share of publicly owned forest, most recent period	%	24.3
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	%	2.1
6.2	Contribution of forest sector to GDP	Share of GDP taken by forestry, most recent period	%	1.22
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods	€/ha	No data
6.5	Forest sector workforce	Forestry labour force as % of total workforce	%	0.62
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	2.86
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ RE), most recent 3-year average	%	-216.64
6.9	Energy from wood resources	Share of wood in total primary energy supply	%	20.5
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes in total wood biomass removals	%	22.9

Policy and institutions (qualitative indicators)

Indicator		Context parameter	Unit	Value
A1	National forest programmes or similar	Starting date of national forest programme or similar	Year	2014
A1	National forest programmes or similar	Type of national forest programme	Type	Formal
A2	Institutional framework	Number of staff who formulate and administer forest policy and law	Number/1,000,000 ha of forest	52.00
A3	Legal regulatory framework and international commitments	Date of enactment of forest law	Year	1979
A3	Legal regulatory framework and international commitments	Date of most recent amendment of forest law	Year	2014
A3	Legal regulatory framework and international commitments	Date of most recent formal statement of forest policy	Year	2008
A4	Financial instruments/economic policy	Total official transfer payments/subsidies	€/ha/year of private forest	5.45
A4	Financial instruments/economic policy	Payment from public budget to state forest organisation	€/ha/year of public forest	No data
A4	Financial instruments/economic policy	Public expenditure on research, education and training per hectare of forest	€/ha/year	2.30
A5	Informational means	Existence of a formal communication and outreach strategy	Yes/No	Yes

Indicator		Assessment parameter	Unit	Threshold	Value
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	-0.05
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	-0.20
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	-0.03
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication 2010	%	>80%	47
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	1.28
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	4.29
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	0.003
3.1	Increment and felling	Ratio fellings/NAI on FAWS, most recent ten-year period, in %	%	>100%	110.0
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha/year	<€10/ha/year	142.16
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	96.2
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Change in %	Any negative change, compared to previous period	0.6
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Change in %	Any decrease	-9.82
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Change in %	Any increase	0.00
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Change in m ³ /ha	Any decrease	0.3
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	23.3
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	6.6
5.1 & 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	138
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha/year	< €5/ha/year	52.50
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	-3.50
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	100

Discussion of parameters for which the threshold was exceeded

(For layout reasons, some of the extensive comments are set out below the table)

	Parameter	Threshold	Value	Are data accurate?	Background and context	Policy response
1.1	Annual average percent change in forest area in most recent ten-year period	Any negative change	-0.05%	Yes	Very small change probably not statistically significant. In Swedish context, small decline not of concern. See below.	In line with the context described there has been no need for any policy response.
1.1	Annual average percent change in area of forest available for wood supply in most recent ten-year period.	Any negative change	- 0.20%	Yes	Reduction due to transfer to protected forest, as a result of policy decisions. See below	In line with the context described there has been no need for any policy response
1.2	Annual average percent change in growing stock on FAWS in most recent ten-year period.	Any negative change	-0.03%	Yes	The decrease of growing stock on FAWS is directly linked to the decrease in area of FAWS. The answer given above is therefore valid also for the growing stock on FAWS	In line with the context described there has been no need for any policy response
3.1	Ratio fellings/NAI on FAWS, most recent ten-year period, in %.	> 100%	110%	Yes	During this period, the ratio was distorted by storms. The inclusion of fellings of natural losses is also a distortion. The felling levels in Sweden are determined by sophisticated outlook studies, not a simple ratio. See below	The main tool is an intensive dialogue with forestry and industry See below
4.2	Share of natural regeneration in total regeneration, change over most recent ten-year period	Any decrease	-9.82%	The best approximation possible See below	Natural regeneration may cause problems on some sites. The decrease in the area of forest that originates from natural expansion or natural regeneration is not seen as a threat to sustainability. See below	No specific policy response necessary. See below

1.1 Change in forest area:

Background and context: There might have been a small loss of forest area during the last ten year period in Sweden. However, the difference between the 2005 and the 2010 estimates (which were also submitted for 2015) is so small that it isn't statistically significant. The expert judgement of the national correspondents is that there has been no significant change in forest area between 2005 and 2015. In a policy context Sweden is a country dominated by forest and such a small loss of forest area is not considered a threat to the sustainability of Swedish forest management or to the sustainability of the society

1.1 Change in area of FAWS

Background and context: In the last ten years Government policy has been to increase the protected forest areas in Sweden. The objective is to secure the biodiversity, cultural and social values of the forest. As a result, the area of legally protected forest (national parks and nature reserves) and voluntary protected forest has increased. This has led to a decrease in the area of FAWS. In a policy context the decrease in FAWS consequently is not considered as a threat to the sustainability of forest management, but rather seen as a prerequisite. In early 2014 the Government decided upon a new set of environmental goals, among which there is a goal to increase the area of protected forest by 350,000 ha. The area of FAWS is therefore expected to further decrease in coming years.

3.1 Fellings/increment ratio

Background and context: During the observed period annual fellings in Sweden were unusually high in relation to the net annual increment, essentially because of two major storms (about 70 million m³ and 20 million m³ in 2005 and 2007), and a high demand for Swedish forest products that peaked in 2007. After 2007, the harvested volume returned to more normal levels in relation to NAI on FAWS.

The ratio between the total felling and the net annual increment may be misleading as the felling of natural losses is included but the natural losses have been excluded from the annual increment. If the natural losses were included in both the numerator and the denominator the fellings would be of the same order of magnitude as the increment on FAWS. This is especially important during the observed period, since there were greater natural losses than usual due to the two storms, and the felling of natural losses is a greater part of the total felling,. Furthermore the data supplied in the 2015 questionnaire is restricted to stems > 10 cm at breast height. Approximately 15% of the total increment is in trees with a dbh less than 10 cm, which has not been accounted for in the calculated ratio. If natural losses and the increment of trees with a dbh less than 10 cm are both taken into account, the fellings in Sweden during the observed period do not exceed the increment on FAWS. The harvested volumes would therefore not be regarded as unsustainable.

In national outlook studies, the sustainable harvesting level is defined as the maximum harvest which does not lower the net annual increment in the future on FAWS. This assumption results in a sustainable harvesting level that is somewhat higher than the current increment on FAWS, since the productivity of the forest is increasing due to better seedlings, better silvicultural methods and so on.

Policy response: The Swedish Forest Agency has had extensive dialogues with the forestry and forest industry to create awareness of the current situation. Creating awareness has historically been sufficient as a policy tool to prevent any unsustainable harvesting levels.

The rising trend in combination with the absolute level of harvesting created some concern in 2006 and 2007, although the absolute level of harvesting was not regarded as unsustainable. As a response to this concern the Swedish Forest Agency intensified the dialogue with forestry and forest industry in 2007 and 2008. Since then the harvest has returned to more normal levels.

4.2 Share of natural regeneration

Data accuracy: In Sweden, there are no records of the origin of the forest. It is not possible to determine whether a middle aged or older stand was originally planted or naturally regenerated. The data submitted is based on the assumption that in 1953 all forest in Sweden came from natural expansion of forest or was naturally regenerated. The annually planted area from 1953 onwards has then been accumulated to calculate the total afforested or planted area. The total afforested or planted area has then been subtracted from the total forest area to estimate the total area of natural expansion or natural regeneration. There are known problems to the approximation: not all forest originated from natural expansion or natural regeneration in 1953, and the assumption that we still harvest stands originating from before 1953 (in fact stands planted in the 1950s are being harvested).

The data appear to be the best approximation possible.

Background and context: Even though the trend and the absolute values are questionable, there is probably no doubt that the area of natural expansion or natural regeneration is decreasing. About 80% of the annually regenerated forest area is regenerated by direct seeding or planting, while some 20% is regenerated by different means of natural regeneration. The high percentage of planting would undoubtedly mean that the forest area originating from natural expansion or natural regeneration is decreasing. This general trend is due to planting of native tree species, as planting of exotic species such as *Pinus contorta* (lodgepole pine) is only marginal today.

In the first years of the new millennium the percentage of natural regeneration was as high as 40%. However, the Swedish Forest Agency has estimated that only about 20% of the annually reforested area is suited for natural regeneration, due to soil conditions and so on. On the other 80% the risk of poor regeneration results is considered too high. The obligation to ensure an acceptable regeneration after harvesting operations is a foundation of Swedish forest policy. The Swedish Forest Agency has therefore recommended both by legal and informational means that natural regeneration is to be used only in stands with suitable soil conditions. Used correctly, natural regeneration could provide several additional values such as timber quality. The decreasing share of natural regeneration is therefore not alarming as it is the result of a move to more site adapted regeneration methods. The agency is however closely monitoring the development.

Other factors taken into account are browsing by moose, a major problem which is worse in naturally regenerated stands, and the fact that about a third of stems in planted stands are naturally regenerated, so that stand structure is similar in planted and naturally regenerated stands.

Seen in the context of other measures taken to promote sustainability in Swedish forestry, the decrease in the area of forest that originates from natural expansion or natural regeneration is not seen as a threat to sustainability. It is not seen as a cause of a major difference in a stands' contribution to biodiversity, social values or protection of water quality due to the origin of the stand, given that the other silvicultural practices are the same. The genetic diversity of native tree species is partly conserved as genetic resources in protected forests outside FAWS

Policy response: In line with the context described, there has been no need for any policy response to the general trend of a decreasing area that originates from natural expansion or natural regeneration.

The negative effect of high amount of moose browsing on pine trees, which negatively influences the use of natural regeneration of pine, is regarded as an area of concern. The policy response is that a new model and organisation for moose management have been developed and implemented. The new model is aiming at creating a better cooperation between land owners, hunters and other parts of society that have an interest in the management of moose populations. It is also aiming for a better balance between the hunting interests and other interests in society such as forestry. There has also been a demonstration area established in southern Sweden, where they try to find methods to change the negative trend of regenerating with pine, by means of an increased dialogue between forest owners and hunters

Country tables: Switzerland

Indicator		Context parameter	Unit	Value
1.1	Forest area	Area of forest as % of total land area (forest cover)	%	31.4
1.1	Forest area	Forest/population ratio (ha of forest/head of population)	ha/head	0.15
1.2	Growing stock	Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	352.6
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of FOWL, €/ha/year of FOWL	€/ha/year FOWL	No data
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	€/ha	No data
4.3	Naturalness	Share of forest undisturbed by man in forest	%	3.2
4.3	Naturalness	Share of plantations in forest	%	0.1
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL	%	0.5
6.1	Forest holdings	Share of publicly owned forest, most recent period	%	67.1
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	%	22.6
6.2	Contribution of forest sector to GDP	Share of GDP taken by forestry, most recent period	%	0.00
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods	€/ha	No data
6.5	Forest sector workforce	Forestry labour force as % of total workforce	%	0.19
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	1.36
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ RE), most recent 3-year average	%	5.64
6.9	Energy from wood resources	Share of wood in total primary energy supply	%	4.2
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes in total wood biomass removals	%	38.6

Policy and institutions (qualitative indicators)

Indicator		Context parameter	Unit	Value
A1	National forest programmes or similar	Starting date of national forest programme or similar	Year	2002
A1	National forest programmes or similar	Type of national forest programme	Type	Formal
A2	Institutional framework	Number of staff who formulate and administer forest policy and law	Number/1,000,000 ha of forest	287.10
A3	Legal regulatory framework and international commitments	Date of enactment of forest law	Year	1993
A3	Legal regulatory framework and international commitments	Date of most recent amendment of forest law	Year	2013
A3	Legal regulatory framework and international commitments	Date of most recent formal statement of forest policy	Year	2011
A4	Financial instruments/economic policy	Total official transfer payments/subsidies	€/ha/year of private forest	164.55
A4	Financial instruments/economic policy	Payment from public budget to state forest organisation	€/ha/year of public forest	No data
A4	Financial instruments/economic policy	Public expenditure on research, education and training per hectare of forest	€/ha/year	No data
A5	Informational means	Existence of a formal communication and outreach strategy	Yes/No	No

Indicator		Assessment parameter	Unit	Threshold	Value
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	0.30
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	0.26
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	0.43
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication 2010	%	>80%	74
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	No data
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	0.89
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	0.004
3.1	Increment and fellings	Ratio fellings/NAI on FAWS, most recent ten-year period, in %	%	>100%	88.6
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha/year	<€10/ha/year	No data
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	81.7
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Change in %	Any negative change, compared to previous period	1.9
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Change in %	Any decrease	-1.05
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Change in %	Any increase	0.0
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Change in m ³ /ha	Any decrease	2.5
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	6.5
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	2.5
5.1 & 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	8
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha/year	< €5/ha/year	-79.44
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	-5.07
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	100

Discussion of parameters for which the thresholds are exceeded

Parameter	Warning level	Value recorded initially	Are data accurate?	Background and context	Policy response
4.2 Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Any decrease	-1.05%	There is no change. It does not seem to be an appropriate indicator. The statistical error of estimation is bigger than the changes.	The indicator is inappropriate: if the forest does not expand naturally and at the same time increased management of coppice forest for energy purpose is promoted - the indicator concerning natural regeneration is changing. If land outside forest is afforested for protective purposes - again a negative change of this indicator. It would be correct, only to consider the proportion natural regeneration to plantation/seeding as it was done before.	No policy response needed
4.9 Area of forest strictly protected for conservation of biodiversity as % of total forest	<3%	2.5%	The Swiss national target for strictly protected forests is 5% by 2030. In 2015 we are well on track with presently 2.7%. For the next years, subsidies for compensating the forest owner for non-intervention will be increased. In addition, there is a Swiss national target for forests protected with interventions for conservation of biodiversity of 5% by 2030. Likewise, by 2015, 2.5% have been achieved and this means the programme is well on track. Here also the public funding for maintaining and enhancing forest biodiversity will be increased in the next years.		
6.3 Net entrepreneurial revenue per hectare, most recent period	<€5 /ha/year	-€79.44 /ha/year	There are different reasons for this negative revenue: <ul style="list-style-type: none"> - Structural: small forest ownership hinders efficient management - The high value of the Swiss franc in comparison to the Euro reduces market opportunities while production costs in Switzerland remain high. - Political: ecosystem services are only partly compensated. <p>In the Swiss forest policy 2020 one goal addresses the increase of economic revenues of the forest owners. In addition, a parliamentary intervention addresses the payment of ecosystem services and will be on the political agenda in due time.</p>		

Country tables: Ukraine

Indicator		Context parameter	Unit	Value
1.1	Forest area	Area of forest as % of total land area (forest cover)	%	16.7
1.1	Forest area	Forest/population ratio (ha of forest/head of population)	ha/head	0.21
1.2	Growing stock	Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	275.1
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of FOWL, €/ha/year of FOWL	€/ha/year FOWL	No data
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	€/ha	No data
4.3	Naturalness	Share of forest undisturbed by man in forest	%	0.6
4.3	Naturalness	Share of plantations in forest	%	3.8
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL	%	3.9
6.1	Forest holdings	Share of publicly owned forest, most recent period	%	92
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	%	100
6.2	Contribution of forest sector to GDP	Share of GDP taken by forestry, most recent period	%	0.26
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods	€/ha	No data
6.5	Forest sector workforce	Forestry labour force as % of total workforce	%	0.34
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	0.40
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ RE), most recent 3-year average	%	-21.61
6.9	Energy from wood resources	Share of wood in total primary energy supply	%	1.3
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes in total wood biomass removals	%	No data

Policy and institutions (qualitative indicators)

Indicator		Context parameter	Unit	Value
A1	National forest programmes or similar	Starting date of national forest programme or similar	Year	2010
A1	National forest programmes or similar	Type of national forest programme	Type	Formal
A2	Institutional framework	Number of staff who formulate and administer forest policy and law	Number/1,000,000 ha of forest	75.00
A3	Legal regulatory framework and international commitments	Date of enactment of forest law	Year	1994/2006
A3	Legal regulatory framework and international commitments	Date of most recent amendment of forest law	Year	2014
A3	Legal regulatory framework and international commitments	Date of most recent formal statement of forest policy	Year	2010
A4	Financial instruments/economic policy	Total official transfer payments/subsidies	€/ha/year of private forest	No data
A4	Financial instruments/economic policy	Payment from public budget to state forest organisation	€/ha/year of public forest	No data
A4	Financial instruments/economic policy	Public expenditure on research, education and training per hectare of forest	€/ha/year	No data
A5	Informational means	Existence of a formal communication and outreach strategy	Yes/No	No

Indicator		Assessment parameter	Unit	Threshold	Value
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	0.09
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	-0.78
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	1.84
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication 2010	%	>80%	100
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	No data
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	0.12
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	0.033
3.1	Increment and fellings	Ratio fellings/NAI on FAWS, most recent ten-year period, in %	%	>100%	23.9
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha/year	<€10/ha/year	No data
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	100.0
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Change in %	Any negative change, compared to previous period	0.2
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Change in %	Any decrease	0.00
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Change in %	Any increase	0.01
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Change in m ³ /ha	Any decrease	0.1
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	No data on
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	5.4
5.1 & 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	-84
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha/year	< €5/ha/year	No data
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	-0.80
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	76

Discussion of parameters for which the threshold was exceeded

Parameter		Threshold	Value	Are data accurate?	Background and context	Policy response
1.1	Annual average percent change in area of forest available for wood supply in most recent ten-year period	Any negative change	-0.78%	The current definition of forest available for wood supply is not fully covered by national statistics in Ukraine, as there are areas with some environmental restrictions but where several types of fellings are permitted. At the moment this category only reports area where final felling is permitted. Besides it is worth mentioning that area given for 2005 was an estimated figure	In the Ukrainian situation a decreasing area of forest available for wood supply indicates that the area with environmental restrictions on forest management has increased	NA
2.1	Percentage of natural ecosystem area at risk of eutrophication for an emission scenario based on current legislation	>80%	100%	The source of these data is not acceptable to the national correspondent. No national data available, but according to expert opinion, there is no significant problem with eutrophication	NA	NA
4.4	Change in share of invasive species, most recent 10 year period, %	Any increase	0.01%	Yes	In Ukraine a slight increase in introduced tree species is normal as there are some difficult forest site conditions where only introduced species can survive.	NA
5.1 and 5.2	Change in area of forest designated as having protective functions (5.1+5.2)	Decrease	-84%	No data available for 2015. The data are not fully comparable. According to expert opinion, this is not an area of concern	NA	NA
6.10	Area accessible for recreation as % of area of FOWL, most recent year	<85%	76%	The national correspondent considers this is not an area of concern. According to Ukrainian legislation citizens have access to practically all forests. In the report it is given data for forests most suitable for recreation or where recreation is possible without any limitation		

Country tables: United Kingdom

Indicator		Context parameter	Unit	Value
1.1	Forest area	Area of forest as % of total land area (forest cover)	%	13.0
1.1	Forest area	Forest/population ratio (ha of forest/head of population)	ha/head	0.05
1.2	Growing stock	Growing stock per hectare of FAWS (forest available for wood supply)	m ³ /ha	207.4
3.3	Non-wood goods	Value of marketed non-wood goods, per hectare of FOWL, €/ha/year of FOWL	€/ha/year FOWL	19.6
3.4	Services	Value of marketed services, per hectare of FOWL, €/ha/year of forest	€/ha	No data
4.3	Naturalness	Share of forest undisturbed by man in forest	%	0.0
4.3	Naturalness	Share of plantations in forest	%	88.8
4.4	Introduced tree species	Share of introduced (including invasive) tree species in FOWL	%	40.0
6.1	Forest holdings	Share of publicly owned forest, most recent period	%	28.4
6.1	Forest holdings	Percentage of private forest area in size class of holdings under 10 hectares	%	28.2
6.2	Contribution of forest sector to GDP	Share of GDP taken by forestry, most recent period	%	0.03
6.4	Expenditures for services	Net government expenditure per hectare forest, average of most recent two periods	€/ha	65
6.5	Forest sector workforce	Forestry labour force as % of total workforce	%	0.07
6.7	Wood consumption	Consumption of wood products per head, 2010-2012, (or most recent 3-year average)	m ³ RE/head	0.99
6.8	Trade in wood	Net imports of roundwood and forest products as % of apparent consumption (both in m ³ RE), most recent 3-year average	%	59.76
6.9	Energy from wood resources	Share of wood in total primary energy supply	%	1.1
6.9	Energy from wood resources	Share of direct woody biomass removals for energy purposes in total wood biomass removals	%	33.1

Policy and institutions (qualitative indicators)

Indicator		Context parameter	Unit	Value
A1	National forest programmes or similar	Starting date of national forest programme or similar	Year	2003
A1	National forest programmes or similar	Type of national forest programme	Type	Similar
A2	Institutional framework	Number of staff who formulate and administer forest policy and law	Number/1,000,000 ha of forest	No data
A3	Legal regulatory framework and international commitments	Date of enactment of forest law	Year	1967/2010
A3	Legal regulatory framework and international commitments	Date of most recent amendment of forest law	Year	No data
A3	Legal regulatory framework and international commitments	Date of most recent formal statement of forest policy	Year	2011
A4	Financial instruments/economic policy	Total official transfer payments/subsidies	€/ha/year of private forest	48.55
A4	Financial instruments/economic policy	Payment from public budget to state forest organisation	€/ha/year of public forest	78.45
A4	Financial instruments/economic policy	Public expenditure on research, education and training per hectare of forest	€/ha/year	4.65
A5	Informational means	Existence of a formal communication and outreach strategy	Yes/No	Yes

Indicator		Assessment parameter	Unit	Threshold	Value
1.1	Forest area	Annual average percent change in forest area in most recent ten-year period	%	Any negative change	0.40
1.1	Forest area	Annual average percent change in area of forest available for wood supply in most recent ten-year period	%	Any negative change	0.40
1.2	Growing stock	Annual average percent change in growing stock on FAWS in most recent ten-year period	%	Any negative change	1.96
2.1	Deposition of air pollutants	Percentage of natural ecosystem area at risk of eutrophication 2010	%	>80%	19
2.2	Soil condition	C/N index, median value for country	C/N Index	<1	1.26
2.4	Forest damage	Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage	%	>5%	No data
2.4	Forest damage	Percent of forest area damaged by fire annually (ten-year average)	%	>2%	No data
3.1	Increment and fellings	Ratio fellings/NAI on FAWS, most recent ten-year period, in %	%	>100%	48.2
3.2	Roundwood	Value of marketed roundwood, per hectare, 2012, €/ha/year of FAWS	€/ha/year	<€10/ha/year	131.18
3.5	Forests under management plans	Percentage of FOWL under formal management plan or equivalent	%	<50%	49.7
4.1	Tree species composition	Share of multi species stands in FOWL, most recent period, %	Change in %	Any negative change, compared to previous period	No data
4.2	Regeneration	Share of natural regeneration in total regeneration, change over most recent 10 year period, %	Change in %	Any decrease	No data
4.4	Introduced tree species	Change in share of invasive species, most recent 10 year period, %	Change in %	Any increase	No data
4.5	Deadwood	Change in volume of deadwood per m ³ of growing stock on FAWS between two most recent reports, m ³ /ha	Change in m ³ /ha	Any decrease	0.0
4.8	Threatened forest species	Number of threatened forest tree species as % of total forest tree species	%	lack of information on parameter	No data
4.9	Protected forests	Area of forest strictly protected for conservation of biodiversity as % of total forest	%	<3%	1.4
5.1 & 5.2	Protective forests	Change in area of forest designated as having protective functions (5.1+5.2)	ha (change over period)	Decrease	0
6.3	Net revenue	Net entrepreneurial revenue per hectare, most recent period	€/ha/year	< €5/ha/year	-49.80
6.6	Occupational safety and health	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Change in accident rate	Increase in accident rate and/or lack of information on accident rates	0.70
6.10	Accessibility for recreation	Area accessible for recreation as % of area of FOWL, most recent year	%	<85%	45

Discussion of parameters for which the threshold was exceeded

Parameter	Threshold	Value recorded	Are data accurate?	Background and context	Policy response
3.5 Percentage of FOWL under formal management plan or equivalent	<50%	49.7%	Figure is an estimate, covering all state woodland, all private sector certified and guesstimate of remainder. It may be an underestimate and cannot be taken to imply that the remaining 50% is at risk.	All woodland areas are protected under felling regulations and many areas have additional protection through landscape designations. The principal conclusion that can be drawn for the ca 50% of woods without management plans is that little or no felling is taking place, many of these woods are small and associated with agricultural enterprises.	In all four countries of the UK, there are strict controls on deforestation and also initiatives in place to encourage forest management planning. Plans are also now required as a condition of RDR ²⁵ funding. New markets for wood-fuel are starting to bring neglected woods back into management and the percentage under formal plans is expected to rise over the next decade.
4.9 Area of forest strictly protected for conservation of biodiversity as % of total forest	<3%	1.4%	Definition restricts to MCPFE classes 1.1 and 1.2, no or minimum intervention. Assumed no 1.1 in the UK. Area of class 1.2 estimated as 15% of classes 1.2+1.3 combined (covering SSSIs, NNRs, LNRs, SPAs & SACs ²⁶).	The UK has a high population density and a low % of forest cover. In general forests and woods have a long history of management and many woodlands managed principally for conservation properly (on ecological grounds) fall into MCPFE 1.3 'conservation through active management' and are therefore excluded from this assessment. Inclusion of such areas would raise the national value well above the warning level.	NA due to woodland history and ecological context.
6.3 Net entrepreneurial revenue per hectare, most recent period	< €5 /ha/year	€-49.80 /ha/year	Value derived from economic accounts in the European framework for Integrated Economic and Environmental Accounting for Forests, submitted to Eurostat & is based on estimate of -£131 million. This has since been revised to -£78 million. Forestry sector in UK is very small; as such, there are some concerns around reliability of some economic estimates. We plan to review the data on economic accounts to try to improve the estimates. Note also that data based on SIC ²⁷ 02; many forestry businesses (e.g. that are part of larger estates) will be assigned to other SIC codes (e.g. agriculture).	The data cover many different types of woodland. Costs associated with forestry in the UK are believed to be high.	Further investigation needed. Some work of possible relevance is currently being undertaken.

²⁵ Retail distribution review (RDR), is the name that has been given to a new set of rules that will be enforced in the UK from the beginning of 2013. The rules are aimed at introducing more transparency and fairness in the investment industry.

²⁶ Sites of Special Scientific Interest, National Nature Reserve, Local Nature Reserve, Special Protection Area, Special Area of Conservation.

²⁷ Standard Industrial Classification SIC is a system for classifying industries by a four-digit code. Established in the United States in 1937, it is used by government agencies to classify industry areas.

Parameter		Threshold	Value recorded	Are data accurate?	Background and context	Policy response
6.6	Total fatal and non-fatal accidents per 1,000 workers, change over two most recent reports (centred on 2005 and 2010)	Increase in accident rate and/or lack of information on accident rates	0.70	Data reported are 5 year averages for employees and self-employed, obtained from Health & Safety Executive. Modest rise of 0.7/1,000 reported non-fatal accidents between 2005 and 2010 is unlikely to be statistically significant and is contrary to the long term (1990-2010) downward trend, particularly given increased harvesting activity.	The UK attaches great importance to safety, health and welfare and continues to focus on improvement across the sector.	The UK Forest Industry Safety Accord was established in 2012 in order to raise the standard of Health, Safety and Welfare in the workplace. It has a high profile and impact both on reporting and on actual incidence. Improvement by 2015 is anticipated.
6.10	Area accessible for recreation as % of area of FOWL, most recent year	<85%	45	Data is for permissive access only, specifically as recorded on the Woodland Trust database. It is a significant underestimate, inclusion of all woodland in Scotland as accessible (under Right to Roam legislation) would increase the UK estimate to around 65%. Including rights of way in the rest of the UK would increase this further.	Revision to this indicator for future reporting may provide a better basis for assessment in future.	

Some facts about the Committee on Forests and the Forest Industry

The UNECE Committee on Forests and the Forest Industries is a principal subsidiary body of the UNECE (United Nations Economic Commission for Europe) based in Geneva. It constitutes a forum for cooperation and consultation between member countries on forestry, the forest industry and forest product matters. All countries of Europe, the Commonwealth of Independent States, the United States of America, Canada and Israel are members of the UNECE and participate in its work.

The UNECE Committee on Forests and the Forest Industries shall, within the context of sustainable development, provide member countries with the information and services needed for policymaking and decision-making with regard to their forest and forest industry sectors, including the trade and use of forest products and, where appropriate, will formulate recommendations addressed to member governments and interested organizations. To this end, it shall:

1. With the active participation of member countries, undertake short-, medium- and long-term analyses of developments in, and having an impact on, the sector, including those developments offering possibilities for the facilitation of international trade and for enhancing the protection of the environment;
2. In support of these analyses, collect, store and disseminate statistics relating to the sector, and carry out activities to improve their quality and comparability;
3. Provide the framework for cooperation e.g. by organising seminars, workshops and ad hoc meetings and setting up time-limited ad hoc groups, for the exchange of economic, environmental and technical information between governments and other institutions of member countries required for the development and implementation of policies leading to the sustainable development of the sector and to the protection of the environment in their respective countries;
4. Carry out tasks identified by the UNECE or the Committee on Forests and the Forest Industries as being of priority, including the facilitation of subregional cooperation and activities in support of the economies in transition of central and eastern Europe and of the countries of the region that are developing from an economic perspective;
5. It should also keep under review its structure and priorities and cooperate with other international and intergovernmental organizations active in the sector, and in particular with the FAO (the Food and Agriculture Organization of the United Nations) and its European Forestry Commission, and with the ILO (the International Labour Organisation), in order to ensure complementarity and to avoid duplication, thereby optimizing the use of resources.

More information about the Committee's work may be obtained by contacting:

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UNECE/FAO publications

Note: other market-related publications and information are available in electronic format at our website.

Geneva Timber and Forest Study Papers

Forest Products Annual Market Review 2015-2016	ECE/TIM/SP/40
Forest Products Annual Market Review 2014-2015	ECE/TIM/SP/39
Promoting Sustainable Building Materials and the Implications on the Use of Wood in Buildings	ECE/TIM/SP/38
Forests in the ECE Region: Trends and Challenges in Achieving the Global Objectives on Forests	ECE/TIM/SP/37
Forest Products Annual Market Review 2013-2014	ECE/TIM/SP/36
Rovaniemi Action Plan for the Forest Sector in a Green Economy	ECE/TIM/SP/35
The Value of Forests: Payments for Ecosystem Services in a Green Economy	ECE/TIM/SP/34
Forest Products Annual Market Review 2012-2013	ECE/TIM/SP/33
The Lviv Forum on Forests in a Green Economy	ECE/TIM/SP/32
Forests and Economic Development: A Driver for the Green Economy in the ECE Region	ECE/TIM/SP/31
Forest Products Annual Market Review 2011-2012	ECE/TIM/SP/30
The North American Forest Sector Outlook Study 2006-2030	ECE/TIM/SP/29
European Forest Sector Outlook Study 2010-2030	ECE/TIM/SP/28
Forest Products Annual Market Review 2010-2011	ECE/TIM/SP/27
Private Forest Ownership in Europe	ECE/TIM/SP/26
Forest Products Annual Market Review 2009-2010	ECE/TIM/SP/25
Forest Products Annual Market Review 2008-2009	ECE/TIM/SP/24
Forest Products Annual Market Review 2007-2008	ECE/TIM/SP/23
Forest Products Annual Market Review 2006-2007	ECE/TIM/SP/22
Forest Products Annual Market Review, 2005-2006	ECE/TIM/SP/21
European Forest Sector Outlook Study: 1960 – 2000 – 2020, Main Report	ECE/TIM/SP/20
Forest Policies and Institutions of Europe, 1998-2000	ECE/TIM/SP/19
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Geneva Timber and Forest Discussion Paper 66**

The study presents the results of the SEMAFOR (System for the Evaluation of the Management of Forests) pilot study, which tested the method through voluntary assessment of the sustainability of forest management in European countries, on the basis of the Pan-European set of criteria and indicators. Scale-neutral indicators were developed and used to describe and assess the situation in 20 participating countries. Thresholds were used for the assessment indicators. Results which exceeded the thresholds were the subject of a discussion with national correspondents to check accuracy, put the data in context and describe the policy response, if any. The study presents detailed results, by indicator and by country, and discusses the main issues arising from the experience. This activity is experimental in nature: its only purpose is to check and test the method. The material presented does not constitute any formal conclusion or statement regarding the status of sustainable forest management in countries taking part in this exercise.



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