***UNECE/FAO Team of Specialists on Monitoring of Sustainable Forest Management***

**Working Group on Sustainable Forest Management Assessment**

**Version of 28 February 2013**

**Background document on the “Proposed system for interactive reporting on the sustainability of forest management”**

On the basis of the experience with SoEF 2011, the decisions of parent bodies and the discussion of the Team of Specialists in St Petersburg, as well as the fact that the next assessment period is already starting, we are submitting for preliminary discussion a method to report in an interactive way on sustainability of forest management at the pan-European level. We recognise that the whole project is very ambitious, and that many aspects will be changed over the course of the preparatory discussions, but hope that putting a (near-complete) suggestion on the table will accelerate and focus discussion on achieving a realistic solution. In our view, the discussions on the topic have shown that a credible international system of reporting and assessment is needed as an input for policy formulation, research and communication, and that the improved data are by now adequate to deliver a credible result. The pan-European assessment should take as its starting point the officially approved criteria and indicators of sustainable forest management, and use the data collected in the on-going State of Europe’s Forests reporting process. This paper does not discuss under what auspices and with what mandate the system should be put into practice, as this requires guidance from policy level bodies, once the method has been developed. This paper proposes, for review:

1. Principles and methods for the reporting
2. A process to analyse the data and arrive at an assessment, in cooperation with national correspondents
3. Proposals as to how the results might be presented
4. Definitions of a few key terms
5. A list of parameters which might be used in the system

Furthermore, an annex systematically reviews all the pan-European indicators, and comments on how and whether they can be used for the reporting on sustainability of forest management.

1. **Principles and methods of the proposed system**

* The system aims to report on the sustainability of forest management at the national or subnational[[1]](#footnote-1) 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 (in a given country) 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 compare their situation with that of other countries.
* It aims to cover all aspects of SFM, as described 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 areas of concern with regard to SFM are not concealed. In fact, we consider that the most important function of the system is to identify actual or potential areas of concern, so that necessary corrective action, inside or outside the forest sector, can be taken.
* 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 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 of concern”, and the instruments 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 is considered sustainable.
* Not all indicators are used for the assessment itself: there are many indicators, but some of them still have low data quality or are hard to use for a meaningful assessment. Furthermore, many indicators are descriptive of the basic context, arising from geography, ecology and history, rather than indicators of possible areas of concern[[2]](#footnote-2). All indicators were reviewed (see annex 1) and a decision taken for each as to whether it should be used for “assessment”, “context” or “background”. Only the “assessment” parameters are used to identify areas of concern. The reduced number of “assessment” parameters also makes the story clearer.
* For each indicator, one or more size-neutral[[3]](#footnote-3) parameters have been identified, making it possible to compare countries fairly. For the assessment parameters, “warning levels” are identified, which can indicate whether, for that topic, there might be concern about sustainability. However, the indicator will not be firmly identified as an area of concern until there has been an in depth review, with country participation, putting the area of concern in context and identifying any special circumstances[[4]](#footnote-4). This process is described in the next section. The quantified “warning level” is thus the first filter of a process, not a rigid final judgement.
* The warning levels for areas of concern about sustainability are the same for all countries, despite major differences between countries in their basic situations. It would be confusing and severely reduce the credibility of the whole exercise if countries were each to set their own warning levels. It would also make any reporting on sustainability of forest management at the regional level difficult and subjective.
* Policies and institutions, and governance in general, are a key part of SFM: indeed policy instruments are the main means of achieving sustainability and addressing threats. In the *State of Europe’s Forests*  reports, information is collected about policies and institutions under the qualitative indicators, but the information collected has so far been rather descriptive than analytical and has not addressed the question of whether the policy instruments in place are appropriate or sufficient for the need. Part B of the qualitative indicators attempts to link the instruments to specific policy areas, but in practice the responses to SoEF 2011 were quite non-specific (most just referred to the forest law) and were not directly linked to the outcomes as monitored by the quantitative indicators. This will be addressed during the process of dialogue with national correspondents who will be asked to describe how the country is addressing any areas of concern which have been identified.
* The results should therefore identify, by indicator and country, “areas of concern” about sustainability and how countries are addressing them. The stress on policy action to address areas of concern makes the exercise positive and provides good opportunities for communication with stakeholders.
* Data quality when identifying parameters: when deciding which parameters could be used, we took into account the availability and quality of data. However, we have ignored the situation in those countries which have really inadequate data overall, and/or very small forest resources; to base the approach on countries with the weakest data quality would reduce the whole system to a lowest common denominator approach, missing an important opportunity.
* Treatment of missing data: To implement evidence-based policy making, adequate information is necessary. Thus, 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. SoEF 2011 assigned the lowest assessment to “No data”, but some considered this too harsh[[5]](#footnote-5), or misleading. We propose that in the forthcoming reporting, “No data” be given a separate identity (i.e. not used to identify warning levels), but absence of data should be 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 areas of concern are identified they 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.

1. **Process of analysis and assessment**

The following stages are proposed:

* **Data collection** for the assessment will be part of the work for SoEF 2015, which covers all the parameters identified for context or assessment. Data for the assessment exercise will be checked and reviewed along with the other SoEF data. There will be no separate data collection for the assessment exercise.
* **Analysis of data**: calculation of size neutral indicators, for context and assessment parameters, identification by authors of indicators where warning levels have been exceeded.
* **Response by national correspondents**, who will be asked to respond to the warning levels, and answer the following questions:
  + **Accuracy of information**: Are the data correct? Has the latest analysis uncovered data related problems which were not previously apparent?
  + **Background and context**: Are there specific circumstances which indicate that there is no need to be concerned even though the standard warning levels have been exceeded? If so, what is the background and explanation?
  + **Policy response**: If concern about an indicator is justified, what measures are being taken or planned to address the issue?
* The authors prepare a **regional synthesis**; presenting and analysing the national situations, including countries’ responses to the warning levels, in an objective and transparent way, for the attention of policy makers (see next section on presentation of results). Data will be put in the regional and national context, and explained as necessary. There will be no policy recommendations in this study, which should be the start, not the end, of an evidence-based reflection on policies for sustainable forest management in Europe. This study will be brought to the attention of appropriate international bodies, and comments invited from experts and policy makers.

1. **Presentation of results**

The analysis would be based on two types of table:

* Tables showing the values[[6]](#footnote-6) for the context and assessment parameters for all countries, similar to tables 87-92 of SoEF 2011. These might be supplemented or replaced by tables organising the same data by country in a standardised country profile
* For each country, a list of potential areas of concern and how they are being addressed, along the lines set out below. These tables would only cover those assessment parameters where the warning level had been surpassed, and would also note when data were insufficient to identify areas of concern. Such a table might be set out as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| Potential area of concern | | | Response |
|  | Parameter | Value |  |
| 1.1 | Change in forest area | -x.x% | The causes of this are ... In response we have put in place the following measures: ..... OR This is not of concern because ... |
| 2.2 | Soil condition | C/N ratio 0.y | The causes of this are ... In response we have put in place the following measures: ..... OR This is not of concern because ... |
| 3.2 | Value of marketed roundwood | No data | There are no data because ... To improve the data situation, the following measures are being taken: ... |
| .. | .. | .. | .. |

The accompanying text would take the following form, after a very brief overview of the basic circumstances: “Country X has areas of concern about sustainability with regard to indicators x.y, a.b, c.d, and is responding in the following ways: ...”. The assessments at the level of criteria should not be aggregated to generate a single sustainability assessment for the country, which would inevitably be the headline result and attract much attention, but might be misleading and conceal contradictory trends for different criteria.

This analysis by country would be followed by a regional synthesis by criteria identifying those criteria or indicators where there are several countries which have areas of concern, along these lines: “For criterion X, there are many areas of concern for indicator X.y (aa countries, mostly in southern/eastern/northern/western Europe), but very few for indicator X.z”. This overview could serve to guide international efforts, helping them to focus on those areas which have been shown to be of widespread concern through an evidence-based process.

**4 Definitions of a few key terms**

The following definitions of the three types of parameters and of the warning levels used in the assessment system are proposed**:**

**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 warning level 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 warning level 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 warning level is identified for background parameters.

**Warning level**: the first filter in the process of identifying an area of concern. When an assessment parameter is over the identified warning level, the analysts contact the national correspondent to check the accuracy of the information and to collect information on the background and circumstances. If after this dialogue, an area of concern is confirmed, the analysts then ask the correspondent what action is being or will be taken by the country to address this area of concern.

**5. Parameters proposed to be used in the assessment of sustainable forest management**

(For reasoning and comments underlying these proposals, see Annex I)

***Criterion 1: Forest Resources and Carbon***

|  |  |  |  |
| --- | --- | --- | --- |
|  | Indicator | Proposed parameter | Proposed 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[[7]](#footnote-7) in forest area in most recent ten-year period | Assessment  Warning level: any negative change |
| 1.1 | Forest area | Annual average percent change in area of forest available for wood supply in most recent ten-year period | Assessment  Warning level: any negative change |
| 1.2 | Growing stock | Growing stock per ha of FAWS | Context |
| 1.2 | Growing stock | Annual average percent change in growing stock on FAWS in most recent ten-year period | Assessment  Warning level: 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 |

***Criterion 2: Forest Health and Vitality***

|  |  |  |  |
| --- | --- | --- | --- |
|  | Indicator | Proposed parameter | Proposed Category |
| 2.1 | Deposition of air pollutants | Percentage of natural ecosystem area at risk of eutrophication for an emission scenario based on current legislation | Assessment  Warning level: >80% |
| 2.2 | Soil condition | C/N index, median value for country | Assessment  Warning level: <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[[8]](#footnote-8) by biotic, abiotic and human-induced causes (ten-year average) – except fire damage | Assessment  Warning level: >5%[[9]](#footnote-9) |
| 2.4 | Forest damage | Percent of forest area damaged by fire annually (ten-year average) | Assessment  Warning level: >2% |

***Criterion 3: Productive Functions of Forests***

|  |  |  |  |
| --- | --- | --- | --- |
|  | Indicator | Proposed parameter | Proposed Category |
| 3.1 | Increment and fellings | Ratio fellings of living trees/NAI on FAWS, most recent ten-year period, in % | Assessment  Warning level: >100% |
| 3.2 | Roundwood | Value of marketed roundwood, per hectare, 2012, €/ha of FAWS | Assessment  Warning level: <€10/ha adjusted for PPP[[10]](#footnote-10) |
| 3.3 | Non-wood goods | Value of marketed non-wood goods, per hectare of FOWL, €/ha of forest | Context |
| 3.4 | Services | Value of marketed services, per hectare of FOWL, €/ha of forest | Context |
| 3.5 | Forests under management plans | Percentage of FOWL under officially registered/approved/formal[[11]](#footnote-11) management plan or equivalent | Assessment  Warning level: <50% |

***Criterion 4: Biological Diversity in Forest Ecosystems***

|  |  |  |  |
| --- | --- | --- | --- |
|  | Indicator | Proposed parameter | Proposed Category |
| 4.1 | Tree species composition | Share of multi species stands in FOWL, most recent period, % | Assessment  Warning level: any negative change |
| 4.2 | Regeneration | Share of natural regeneration in total regeneration, change over most recent 10 year period, % | Assessment  Warning level: 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  Warning level: any increase |
| 4.5 | Deadwood | Change in volume of deadwood per m3 of growing stock on FAWS between two most recent reports, m3/ha | Assessment  Warning level: 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  Warning level: lack of information on parameter |
| 4.9 | Protected forests | Area of forest/FOWL strictly protected[[12]](#footnote-12) for conservation of biodiversity as % of total forest | Assessment  Warning level: <3% |

***Criterion 5: Protective Functions of Forests***

|  |  |  |  |
| --- | --- | --- | --- |
|  | Indicator | Proposed parameter | Proposed 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  Warning level: decrease |
| 5.2 | Protective forests – infrastructure and other managed natural resources |

***Criterion 3: Socio-economic Functions of Forests***

|  |  |  |  |
| --- | --- | --- | --- |
|  | Indicator | Proposed parameter | Proposed 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 10ha | Context |
| 6.2 | Contribution of forest sector to GDP | Share of GDP taken by forest sector, most recent period, % | Context |
| 6.3 | Net revenue | Net entrepreneurial revenue per ha, most recent period, in €/ha | Assessment  Warning level: < €5/ha, adjusted for PPP[[13]](#footnote-13) |
| 6.4 | Expenditures for services | Net government expenditure per ha forest, average of most recent two periods, in €/ha | 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 1000 workers, change over two most recent reports (centred on 2005 and 2010) | Assessment  Warning level: increase in accident rate and/or lack of information on accident rates. |
| 6.7 | Wood consumption | Consumption of wood products per head, 2010-2012, m3 roundwood equivalent, most recent 3-year average | Context |
| 6.8 | Trade in wood | Net imports of roundwood and forest products as % of apparent consumption(both in m3 roundwood equivalent), 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  Warning level: <85% |
| 6.11 | Cultural and spiritual values | No meaningful parameter found | NA |

***Pan-European Qualitative Indicators for SFM:***

***Part A: Overall policies, institutions and instruments for SFM***

|  |  |  |  |
| --- | --- | --- | --- |
|  | Indicator | Proposed parameter | Proposed Category |
| A.1 | National forest programmes or similar | Date and status[[14]](#footnote-14) of NFP or similar | Context |
| A.2 | Institutional frameworks | Number of staff who formulate and administer[[15]](#footnote-15) 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 of private forest[[16]](#footnote-16) | Context |
| A.4 | Financial instruments/  economic policy | Payment from public budget to SFO[[17]](#footnote-17), and contribution by SFO to public budget, net transfer, in €/ha of public forest | Context |
| A.4 | Financial instruments/  economic policy | Public expenditure on research, education and training per ha of forest, €/ha | Context |
| A.5 | Informational means | Is there a formal communication and outreach strategy? | Context |

**Annex I**

**Comments on suitability of parameters for assessment or context**

This table presents, in note form, the thinking underlying the choice of context and assessment parameters, as well as warning levels.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Indicator | Proposed parameter | Data quality and availability in SoEF 2011[[18]](#footnote-18) | Suitability of parameter for SFM assessment/considerations for warning levels |
| 1.1 | Forest area | Area of forest as % of total land area (forest cover) | Satisfactory | Essential context information |
| 1.1 | Forest area | Forest/population ratio (ha of forest/head of population) | Satisfactory | Along with forest cover, puts forest sector in national context |
| 1.1 | Forest area | Annual average percent change in forest area in most recent ten-year period | Satisfactory | Whereas the level of forest cover results from many specific, notably historical factors, and a country may decide, or not, to expand forest cover, a significant reduction of forest cover should be considered a cause of concern |
| 1.1 | Forest area | Annual average percent change in area of FAWS in most recent ten-year period | Satisfactory | A decrease in the area of forest available for wood supply is an area of concern for the forest’s sustainable wood supply capacity, although it may be justified, for instance if certain areas are being devoted to biodiversity conservation. |
| 1.2 | Growing stock | Growing stock per ha of FAWS | Satisfactory | Differences reflect ecological circumstances and silvicultural history, not sustainability, but relevant to situate country in its silvicultural context |
| 1.2 | Growing stock | Annual average percent change in growing stock on FAWS in most recent ten-year period | Satisfactory | While the *level* of growing stock does not say anything about sustainability, a *change* may be significant. A reduction in growing stock could indicate overcutting, exceptional damage, or deforestation all of which represent areas of concern for sustainability. However, it could also indicate a policy to reduce growing stock levels to rejuvenate forests, so background information is essential. |
| 1.3 | Age structure and/or diameter distribution | Imbalance in age structure | Several data gaps (missing countries, uneven aged stands) | Information on age structure is essential for wood supply projection, but is hard to use to assess sustainability. Age class structure is determined by past history, species composition etc. It is hard to define “imbalance” objectively, or to reduce the complex information into meaningful indicators. |
| 1.4 | Carbon stock | Annual average percent change in total forest carbon stock, last five-year period, % | Data on above ground carbon estimated on basis of growing stock. Soil and below ground carbon is often roughly estimated, with few data on change | There is a strong correlation between data for forest carbon (1.4) and for growing stock (1.2). Thus, despite the importance of carbon fluxes, the two indicators cannot be considered independent of each other (until carbon flows are measured directly rather than estimated on the basis of wood). Changes in carbon stock may also be hard to interpret: reduction in forest carbon stock could be sustainable from a broader perspective if renewable wood harvests replace non-renewable energy sources |

Criterion 2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Indicator | Proposed parameter | Data quality and availability | Significance of parameter for SFM assessment |
| 2.1 | Deposition of air pollutants | Percentage of natural ecosystem area at risk of eutrophication for an emission scenario based on current legislation | Satisfactory: based on work by ICP Modelling and Mapping. Covers “natural ecosystem area”, not only forest. | Very clear indicator of an outside pressure on forest health and vitality, calibrated to take account of local variability (critical loads are site specific). However, there is criticism of how “critical loads” are calculated. It is difficult to say at what percentage at risk of eutrophication, this becomes an “area for concern” (many European countries record 100% of natural ecosystem area at risk). It would be advisable to consult the experts who fixed existing critical loads. |
| 2.2 | Soil condition | C/N index, median value for country | Satisfactory for countries in BioSoil project, absent elsewhere. No certainty as to whether new data will be available for 2015 | Clear scientific indicator of soil disturbance. A C/N value below 1 at a sample plot is accepted as a sign of soil disturbance (see discussion of this indicator in SoEF 2011), so if the median value for the country is below 1, there is cause for concern. |
| 2.3 | Defoliation | Percent of sample trees in defoliation classes 2+3+4 | Annual data, based on ICP Forest, level 1. Problem getting national results for small countries with few sample plots | Uncertainty of significance of data, (cause/effect or dose/response relationships), unexplained fluctuations over time, multiple causes for single symptom, all make it hard to interpret the significance of these data. |
| 2.4 | Forest damage | Percent of forest area with damage by biotic, abiotic and human-induced causes (ten-year average) – except fire damage | Many data problems, including gaps, double counting, “natural” levels of damage, whether area damaged is a cumulative total or the amount “damaged” in a particular year, inconsistent approaches to damage according to type of damage. | The level of forest damage is clearly important for sustainability, but it is difficult to establish “warning levels” on an objective basis, especially in view of the data problems inherent in this area. Before forest damage can be used as a credible assessment parameter, progress needs to be made on data quality and comparability and on how severe damage can be before becoming an “area of concern” |
| 2.4 | Forest damage | Percent of forest area damaged by fire annually (ten-year average) | Satisfactory (EFFIS) | Fire is a major threat to sustainability in several countries. However, there will always be fires in southern Europe, so it is difficult to identify a “warning level”. The value of the threshold needs expert review. |

Criterion 3

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Indicator | Proposed parameter | Data quality and availability | Significance of parameter for SFM assessment |
| 3.1 | Increment and fellings | Ratio fellings of living trees/NAI on FAWS, average of most recent ten year period, in % | Satisfactory | Normally, if fellings>NAI, this indicates over-use of the forest and reduction of the forest capital. However, there are several legitimate reasons for fellings>NAI, including need to reduce GS/ha, adjust age structure, clear up after storms etc. so the warning level is only the beginning of a discussion, not an objective measure of over-cutting. Therefore, the 100% warning level should be only the start of an enquiry into whether harvesting is at an unsustainable level. The materials balance for forest residues etc. should also be considered.[[19]](#footnote-19) Only fellings of living trees (i.e. total fellings minus fellings of natural losses) should be taken into account as dead trees are taken into account as natural losses in calculating NAI, and the NAI should refer only to FAWS. If possible fellings should be adjusted by deducting fellings on non-FAWS areas. |
| 3.2 | Roundwood | Value of marketed roundwood, per hectare, 2012, €/ha of FAWS[[20]](#footnote-20) | 25 countries reported for SoEF 2011, so just adequate | Measures intensity of use of forest area for production of wood. The absolute level will vary according to situation (e.g. GS/ha, species, market conditions), but is unsustainable if too low. This indicator also measures, along with 6.3, the contribution the (wood) productive functions of forests make to society.  The warning level is arbitrary, and should be adjusted to take account of prices and prosperity in the country concerned (see annex 2) |
| 3.3 | Non-wood goods | Value of marketed non-wood goods, per hectare of FOWL, €/ha of FOWL | “Fragmentary” data sets, according to SoEF. | Revenue from non-wood goods is essential to assess production functions of forests, although there is ambiguity about whether value data received refer to the value of the final product (including later added value) or the money paid to the forest owner.  Ideally, the same approach as 3.2 would be taken, but data are too weak. |
| 3.4 | Services | Value of marketed services, per hectare of FOWL, €/ha of FOWL | Data “limited” in all 16 reporting countries, and often not comparable | This indicator provides desirable information to assess intensity of forest use to supply marketed services and generate income. Clarify that this indicator refers to value of marketed services (i.e. real income to the owner), not a theoretical estimate of the value of services supplied. Ideally, the same approach as 3.2 would be taken, but data are too weak. |
| 3.5 | Forests under management plans | Percentage of FOWL under officially registered/approved/formal management plan or equivalent | Good coverage, but lack of rigour on definitions in some countries[[21]](#footnote-21). | This indicator is clearly relevant to assessment of SFM, but there is major data ambiguity, notably about the effectiveness of “informal” management plans for private forest owners, which are not registered or approved in many countries, as owners have the right to manage how they please. Some of these plans are not written down (which does not in itself prevent sustainable management). At present it is hard to say with any objectivity how many of these informal plans are credible and effective. The enquiry format is being tightened, and the assessment parameter should be adjusted in accordance with the final version. |

Criterion 4

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Indicator | Proposed parameter | Data quality and availability | Significance of parameter for SFM assessment |
| 4.1 | Tree species composition | Share of multi species stands in FOWL, most recent period, % | Satisfactory | Multi species stands are often considered positively correlated with biodiversity. However, this is too simplistic (for instance, in the boreal region, single species stands often occur naturally) and the presence of multi species stands is only a rough proxy for biodiversity. However, in most circumstances, a decline in the share of multi species stands would indicate a loss of biodiversity. |
| 4.2 | Regeneration | Share of natural regeneration in total regeneration, change over most recent 10 year period, % | Satisfactory number of responses. Unexplained major differences between similar countries. | Natural regeneration addresses both genetic diversity and management approaches, as it uses local genetic material and avoids more intensive silvicultural approaches. Higher shares of natural regeneration would favour biodiversity at the genetic level, even if they do not favour more productive strains. As this indicator is in the biodiversity criterion, so low levels of natural regeneration may be considered an area of concern. The levels in different countries are difficult to explain, but a decrease in the share of natural regeneration would in most cases indicate a loss of biodiversity. |
| 4.3 | Naturalness | Share of forest undisturbed by man in FOWL, % | Satisfactory | It is impossible in the medium, even long, term to make any significant change in share of undisturbed forest so this indicator does not describe management, although it is essential for context |
| 4.3 | Naturalness | Share of plantations in FOWL, % | Satisfactory | It is impossible in the medium, even long, term to make any significant change in share of plantations so this indicator does not describe management, although it is essential for context There is also overlap with area of introduced species (4.4) |
| 4.4 | Introduced tree species | Share of introduced (including invasive) tree species in FOWL, % | Satisfactory | Introduced tree species are often in monospecific plantations, which are sometimes low in biodiversity. However, the share of introduced species, like that of plantations or undisturbed forest is a structural feature of a country’s forest sector, and almost impossible to change significantly in the short to medium term. Therefore this indicator seems more useful for context, than for assessment of biodiversity, especially as it would be very difficult to identify a warning level. |
| 4.4 | Introduced tree species | Change in share of invasive species, most recent 10 year period | 34 countries provided information of area of invasive species for 2005 or 2010 | Invasive species are by definition an area of concern for biodiversity, although their prevalence varies widely. Therefore any increase must be considered an area of concern for biodiversity |
| 4.5 | Deadwood | Change in volume of deadwood per m3 of growing stock on FAWS between two most recent reports, m3/ha | Adequate, improving. “Desirable” or “natural” level of deadwood varies widely by ecosystem and management system. | Deadwood is widely used as a proxy for biodiversity. Differences in ecological conditions mean that any absolute warning level for deadwood/ha is bound to be misleading, but a decrease in this parameter would be a cause for concern from the biodiversity point of view. |
| 4.6 | Genetic resources | Share of forest land managed for conservation of genetic resources, % | SoEF 2011 responses often aggregated in one figure the area of seed orchards for wood production with the area used for *in situ* genetic conservation. Separate data should be collected for the two, with the second more important for biodiversity. | A simple ratio between *in situ* genetic conservation areas and total forest is not very meaningful as the objective is to conserve the genetic diversity of natural forests, and the need for *in situ* genetic conservation will vary widely, according to the genetic variability of the forests. |
| 4.7 | Landscape pattern | Landscape pattern index: normalised connectivity per landscape unit and average proportion of “core natural” forest (used in SoEF 2011). | Supplied by JRC research project (only EU countries). | The concepts are quite abstract and the results not yet well understood. Data are only available for EU+ countries, and the significance of the results presented in 2011 not yet clear. The approach should be developed until it can provide a clear indicator of forest fragmentation at the national level. |
| 4.8 | Threatened forest species | Number of threatened forest tree species as % of total forest tree species | Many missing data and clear non-comparability of results (both for total and for threatened species) | A high percentage of threatened species does not necessarily imply threats to biodiversity, as better research identifies more threats and some countries have more species (total and threatened). A country which is on the edge of many ecosystem types will probably have more threatened species than one which is in the centre of a homogeneous ecosystem, and a country with well developed monitoring of threatened species will register more threatened species than one which does not have the necessary resources and institutions. As the status of biodiversity at the species level is a clear and strong indicator of biodiversity, lack of reliable information on this indicates a weakness in the institutions responsible for biodiversity protection |
| 4.9 | Protected forests | Area of forest/FOWL strictly protected[[22]](#footnote-22) for conservation of biodiversity as % of total forest | Data available, but significant differences in interpretation of guidelines, notably for classes 1.3 and 2[[23]](#footnote-23), leading to weak comparability for those classes | The extent of protection is clearly significant as a policy response to loss of biodiversity. Official targets exist (e.g. CBD), and this indicator appears in many other contexts. However, examination of responses to SoEF 2011 shows that countries have interpreted the protection classes differently, making international comparisons difficult. For that reason, “active management” (1.3) and “landscape” (2) categories have been excluded as the differences in interpretation are too great for fair comparisons and meaningful assessment. The warning level of 3% for area of strictly protected forest is arbitrary as the official targets under CBD refer to all protected areas (not just strictly protected), leading to the aforementioned comparability problems |

Criterion 5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Indicator | Proposed parameter | Data quality and availability | Significance of parameter for SFM assessment |
| 5.1 | Protective forests – soil, water and other ecosystem functions | Change in area of forest designated as having protective functions | Many data gaps, and confusion between area “designated” as having protective functions and area which has protective functions. Data on the latter are becoming more available. | The area of forest which has protective functions is determined by geography, and unlikely to be changed by management, while the “designation” is a policy measure, and thus a better measure of sustainability. A decrease in the area “designated” as having protective functions would be a cause of concern, as it would indicate a weakening of policy instruments for protection functions of forests. |
| 5.2 | Protective forests – infrastructure and other managed natural resources |

Criterion 6

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Indicator | Proposed parameter | Data quality and availability | Significance of parameter for SFM assessment |
| 6.1 | Forest holdings | Share of publicly owned forest, most recent period, % | Satisfactory | The relative share of public and private owners is basic information for all policy, but not an indicator of sustainability as both public and private systems may be sustainable. There is wide variation of ownership patterns in Europe due to history and social choices. . |
| 6.1 | Forest holdings | Percentage of private forest area with holdings under 10 ha | Adequate | The size of holdings is an important influence on costs and on policy instruments. Very small private holdings raise costs of wood mobilisation and complicate policy implementation. However, they do not necessarily constitute areas of concern for sustainability, if they are properly managed, surveyed and supervised. Furthermore property rights are, rightly, very difficult and slow to change. The share of private forest with small holding sizes describes the type of policy and social environment which will influence decisions. |
| 6.2 | Contribution of forest sector to GDP | Share of GDP taken by forest sector, most recent period, % | Satisfactory | This share is determined as much by the size of non-forest GDP as by forest sector GDP, and almost impossible to influence by forest sector policy measures. In a large economy, the forest sector can be large and well run while accounting for only a small share of GDP. |
| 6.3 | Net revenue | Net entrepreneurial revenue per ha, most recent period, in €/ha | Adequate where provided, missing outside EU | Net revenue will vary according to priorities and circumstances, but if it is negative or so small that managing a forest is a financial burden on owners, nationwide, there must be a concern about sustainability. This information also makes it possible to calculate hw many hectares of forest can (on average) provide a living wage.  Need to improve robustness and coverage (to non-EU countries) of data |
| 6.4 | Expenditures for services | Net government expenditure per ha forest, average of most recent two periods, in €/ha | Missing data, lack of comparability because of unclear concepts (government payment for specific services v. general transfer payments to forest owners) | Need to separate different types of government expenditure (transfer payments, costs of forest administration and managing state forests, income from forests, revenue from state forests) (The enquiry for indicator 6.4 is being revised in this direction). The amount of money Government is able to invest in sustainable forest management is a valuable indicator of the importance attached by society to SFM, although differences in national situations prevent this being used as an assessment parameter. “. |
| 6.5 | Forest sector workforce | Forest sector labour force as % of total workforce | Adequate | Determined essentially by structure of the economy (notably employment in other sectors), not an influence on sustainability of forest management. |
| 6.6 | Occupational safety and health | Total fatal and non-fatal accidents per 1000 workers, 2012, change over two most recent reports (centred on 2005 and 2010) | Many missing and non-comparable[[24]](#footnote-24) | This indicator is essential to assess the social dimension of SFM, but there are major problems of comparability. However an increase of the accident rate would be an area of concern. For this indicator, lack of relevant information clearly implies a failure to monitor occupational safety and health, which is in itself an area of concern about sustainability SoEF 2011 data were manifestly not comparable, so a major effort is necessary to improve data and clarify concepts. |
| 6.7 | Wood consumption | Consumption of wood products per head, 2010-2012, m3 roundwood equivalent, most recent 3-year average | Satisfactory | The level and pattern of wood consumption is influenced by economic, technical and cultural factors. It is hard to see how one level of consumption would be more or less sustainable than another[[25]](#footnote-25). |
| 6.8 | Trade in wood | Net imports of roundwood and forest products as % of apparent consumption (both in m3 roundwood equivalent), most recent 3 year average. | Satisfactory | Most countries’ trade position is determined, at least in part, by structural factors, e.g. ratio between population/markets and wood supply/industry. The ratio between trade and consumption is an essential part of the context of the forest sector. However, in a globalised world, it is not possible to say whether it is more sustainable to be export oriented or import dependent (assuming imports originate in sustainably managed forests). |
| 6.9 | Energy from wood resources | Share of energy from wood in national energy production | Satisfactory/improving with JWEE | This ratio is strongly determined by national energy structure and wood consumption pattern. As a consequence, in many energy intensive countries, wood will always be marginal, because the volumes of other energies are so large. In these countries a rather low share of wood energy might be the maximum attainable. |
| 6.9 | Energy from wood resources | Share of direct woody biomass removals for energy purposes from forests and outside forests, % | Directly calculated in JWEE | The relative importance of energy among uses for wood, compared to use as material, is an important part of the context, and probably changing significantly in many countries. |
| 6.10 | Accessibility for recreation | Area accessible for recreation as % of area of FOWL | Satisfactory | Assesses one of forest’s main functions: supply of recreation. Ideally an assessment parameter would combine accessibility for recreation with actual use but data on forest visits are weak. Identifying a warning level for accessibility is arbitrary, although in most countries over 95% of FOWL is accessible for recreation.  If more than 15% of forests are not available for recreation, there might be cause for concern. |
| 6.11 | Cultural and spiritual values | Index of data availability on number of cultural and spiritual sites | Very weak | Although the importance of cultural values is accepted, the data supplied on the number of cultural and spiritual sites are not meaningful and not comparable. |

***Qualitative indicators***

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| --- | --- | --- | --- | --- |
|  | Indicator | Proposed parameter | Data quality and availability | Significance of parameter for SFM assessment |
| A.1 | National forest programmes or similar | Date and status[[26]](#footnote-26) of NFP or similar | Satisfactory | An NFP or similar in conformity with the criteria laid down by MCPFE in Vienna is recognised as an essential element of SFM |
| A.2 | Institutional frameworks | Number of staff who formulate and administer[[27]](#footnote-27) forest policy and law, per hectare of forest | Problems of comparability and coverage | For SFM, it is important to have enough staff to formulate and administer policies effectively and efficiently. However, defining “enough” depends on forest policy objectives, administrative traditions and methods and national circumstances so this indicator cannot be used for assessment. |
| A.3 | Legal/regulatory framework | Date of forest law and of most recent formal statement of forest policy | Satisfactory | Forest law and formal forest policy are the foundation of sustainable forest management at the national level. |
| A.4 | Financial instruments/  economic policy | Total official transfer payments/subsidies, in €/ha of private forest[[28]](#footnote-28) | Problems of comparability | Public funds are needed to promote and maintain SFM. These take several forms, notably financial support to private forest owners to help them achieve socially agreed objectives, funds to manage publicly owned forests (if they do not generate a positive income flow) and support for research and education linked to the forest sector. Indicator A.4 covers all of those. It will be necessary to adapt A.4 in the light of the revised formulation of 6.4, which covers the same ground |
| A.4 | Financial instruments/  economic policy | Payment from public budget to SFO[[29]](#footnote-29), and contribution by SFO to public budget, net transfer, in €/ha of public forest | Weak |
| A.4 | Financial instruments/  economic policy | Public expenditure on research, education and training per ha of forest, €/ha | Partial |
| A.5 | Informational means | Is there a formal communication and outreach strategy? | Satisfactory | The importance of communication for SFM is now widely recognised, and the existence of a formal communication strategy indicates government commitment in this area. |
| B.1 to B.12 | Policies, institutions and instruments by policy area | For each of the twelve policy areas, countries supply information on policy objectives and the instruments in place to achieve those objectives | Much information supplied in 2011 (quality varies by country and policy area), but hard to generate a meaningful synthesis | To assess SFM, it is desirable to examine whether the instruments are put in place to address areas of concern. The process whereby national correspondents respond to the areas of concern identified in the assessment exercise should provide this information. |

**Annex II**

**Adjustment of warning levels expressed in monetary terms**

A few assessment parameters[[30]](#footnote-30) are expressed in monetary terms, such as €/ha. These are in criterion 3 (production functions) and criterion 6 (socioeconomic functions), which are of necessity expressed in economic, not physical units. However, the level of national prosperity must also play a role as well as local costs. A revenue of €10/ha (converted at market exchange rates) has quite different significance in an advanced highly prosperous economy, or in a poor economy with near subsistence agriculture in rural areas. A “warning level” which would appear rather low in a rich economy might be very hard to achieve even in good circumstances in a poor one. For that reason when the warning level is expressed in economic terms (Euros), data supplied should be adjusted to take account of relative prosperity, calculated using purchasing power parity (PPP), which takes account not only of market exchange rates, but also of prices, so as to measure the real capacity to purchase a standard basket of commodities. A method for fair and practical adjustment of monetary values of warning levels is being developed in consultation with economists

1. For instance provinces or autonomous regions which have responsibility for forest policy. It is not applicable at the level of counties or communes. [↑](#footnote-ref-1)
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 SFM, not an element of it. [↑](#footnote-ref-2)
3. For instance percentages and ratios (m3/ha etc.) [↑](#footnote-ref-3)
4. One example would be when fellings in one year were much higher than increment, because of the need to remove wood after a storm, not because of systematic over-cutting. [↑](#footnote-ref-4)
5. There is also a risk that correspondents faced with potentially embarrassing results might prefer not to report them, rather than expose an area of concern. Such a reaction would be very damaging to the whole assessment process. [↑](#footnote-ref-5)
6. Or “No data” when that is the case. [↑](#footnote-ref-6)
7. 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 [↑](#footnote-ref-7)
8. Area with damage avoids double counting of damage from different causes. It describes a state in a given year, not the area damaged in a specific year. [↑](#footnote-ref-8)
9. This warning level should only be used if there is a significant improvement on data quality compared to SoEF 2011. [↑](#footnote-ref-9)
10. To take account of differences in prosperity and income between countries, the warning levels in € (indicators 3.2, 3.3, 3.4, 6.3) should be adjusted as a function of GDP/head, using Purchasing Power Parity. See note in the Annex II. [↑](#footnote-ref-10)
11. Terminology and warning level to be adapted according to decisions as regards data collection for indicator 3.5 [↑](#footnote-ref-11)
12. MCPFE classes 1.1 and 1.2 only [↑](#footnote-ref-12)
13. See Annex II [↑](#footnote-ref-13)
14. No NFP, NFP in development, NFP in implementation, NFP in review. (includes “similar”) [↑](#footnote-ref-14)
15. 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. [↑](#footnote-ref-15)
16. Needs detailed work. Ideally would include fiscal measures as well as transfer payments. Need to decide, among many other things, how to treat state forest organisations which act as private companies and receive certain state payments as if they were private owners. Coordinate with new approach for indicator 6.4 [↑](#footnote-ref-16)
17. This will be difficult in those countries where state forests are managed by a government department, with costs from the state budget and income from wood sales partly retained and partly transferred to the central budget. [↑](#footnote-ref-17)
18. This assessment does not take into account those countries which very poor data overall: to take this into account everywhere would lead to a lowest common denominator approach losing the opportunity to analyse the situation in countries with “normal” data quality and availability. [↑](#footnote-ref-18)
19. A working group under the ToS is looking into this problem. [↑](#footnote-ref-19)
20. The same unit is used for 3.2, 3.3 and 3.4, so that they could be aggregated – if sufficient data were available. [↑](#footnote-ref-20)
21. For instance one country « assumed » private forest owners had management plans. As a result, countries with more rigorous data handling look worse than those who do not review the data carefully. [↑](#footnote-ref-21)
22. MCPFE classes 1.1 and 1.2 only [↑](#footnote-ref-22)
23. « Actively managed for conservation » and « Landscape” [↑](#footnote-ref-23)
24. In SoEF 2011, this parameter varied between 0.8 and 186, for no apparent reason. Causes may be definition of what constitutes an accident (how many days off work), coverage (inclusion or not of office staff, self employed contractors etc.), weak monitoring systems, as well as objective dangers (mountain conditions, which are bound to raise accident levels, compared to flat terrain) and choices of harvesting method (mechanisation). [↑](#footnote-ref-24)
25. A high level is associated with prosperity, brings revenue to the sector, and might indicate substitution of non-renewable materials, while a low level would indicate less pressure on resources and more efficient use patterns. [↑](#footnote-ref-25)
26. No NFP, NFP in development, NFP in implementation, NFP in review. (includes “similar”) [↑](#footnote-ref-26)
27. 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. . [↑](#footnote-ref-27)
28. Needs detailed work. Ideally would include fiscal measures as well as transfer payments. Need to decide, among many other things, how to treat state forest organisations which act as private companies and receive certain state payments as if they were private owners. Use data and concepts from 6.4 [↑](#footnote-ref-28)
29. This will be difficult in those countries where state forests are managed by a government department, with costs from the state budget and income from wood sales partly retained and partly transferred to the central budget. [↑](#footnote-ref-29)
30. Indicators 3.2, 6.3. [↑](#footnote-ref-30)