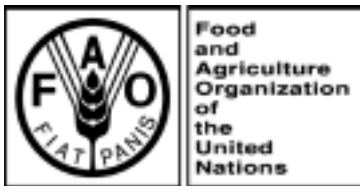

Use of Criteria and Indicators for Monitoring, Assessment and Reporting on Progress toward Sustainable Forest Management in the United Nations Forum on Forests

Report prepared for the

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1. Introduction

Monitoring, assessment and reporting (MAR) is a critical function of the United Nations Forum on Forests (UNFF). When the Economic and Social Council (ECOSOC) of the United Nations established the UNFF in October 2000, it was decided that the UNFF would, among other things:

> *"Monitor and assess progress at the national, regional and global levels through reporting by Governments, as well as by regional and international organizations, institutions and instruments, and on this basis consider future actions needed*."

Countries agreed in the first session of the UNFF (UNFF 1), held in New York in June 2001, that the UNFF's function of MAR would comprise the following areas:

(1) "Progress in implementing the proposals for action of the Intergovernmental Panel on Forests (IPF) and the Intergovernmental Forum on Forests (IFF)";
(2) "Progress towards sustainable forest management of all types of forests"; and
(3) "Review of the effectiveness" of the international arrangement.

Furthermore, UNFF 1 stressed *"the importance of the use of regional and national criteria and indicators for sustainable forest management as a basis for reporting on sustainable forest management"*.

Criteria and indicators (C&I) for sustainable forest management (SFM) were developed to provide countries with a framework for defining SFM and assessing progress toward this goal. Criteria and indicators are tools to help identify trends in the forest sector and the effects of forest management interventions over time, and to facilitate decision making in national forest policy processes. The ultimate aim of these tools is to promote improved forest management practices over time, and to further the development of a healthier and more productive forest estate.

Criteria define essential elements against which sustainability of forest management is judged, with due consideration paid to the environmental, economic and socio-cultural roles of forests and forest ecosystems. Each criterion is defined by indicators, which are monitored periodically. Changes in the indicators between periods indicate whether a country is moving towards or away from sustainability.

This paper has been prepared by the Food and Agriculture Organization (FAO) for the International Expert Meeting on Monitoring, Assessment and Reporting on Progress toward Sustainable Forest Management (Yokohama, Japan, 5-8 November 2001). The outcome of the discussions in the Japan meeting will provide useful input to the Secretary-General's Report on Monitoring, Assessment and Reporting to the second session of the UNFF in March 2002, and to subsequent discussions on MAR in the UNFF.

The paper focuses on how criteria and indicators for SFM might be used by the UNFF in its efforts to monitor, assess and report on progress in sustainable forest management. It gives an overview of the ongoing international C&I processes and how these processes use criteria and indicators to assess progress toward SFM. The paper examines the availability of information on the indicators, and describes monitoring, assessment and reporting activities of the processes, including obstacles. Finally, it identifies several issues which will have a bearing on the development of the UNFF's function of MAR on progress toward sustainable forest management.

2. International Processes on Criteria and Indicators for Sustainable Forest Management

A consensus has emerged within the past decade that progress toward sustainable forest management can be assessed using a framework of criteria and indicators. While the C&I framework may not be the only mechanism for monitoring, assessing and reporting on SFM, it is the only one that has so far been widely accepted and is being used by many countries.

ITTO was the first major international body to conduct work on criteria and indicators for sustainable forest management. In 1990, it developed guidelines for the sustainable management of natural forests in the tropics (ITTO, 1990) and two years later published criteria for monitoring sustainability in tropical moist forests (ITTO, 1992). Since then, eight other major C&I processes have been developed (see Table 1 and the summary in FAO, 2001a.) Together, these nine processes involve approximately 150 countries[1] and cover most of the world's forested area.

The processes are similar in objectives and approach, but differ somewhat in content and structure. They have all developed criteria and indicators for use at the national level. The criteria identified by the processes (see annex 1) correspond fairly closely, all incorporating, in some fashion, the following fundamental elements of SFM:

- extent of forest resources and global carbon cycle;
- forest ecosystem health and vitality;
- biological diversity in forest ecosystems
- productive functions of forests
- protective functions of forests
- socio-economic functions and conditions
- political, legal and institutional frameworks

The indicators, however, vary from process to process in both technical content (reflecting differences in priorities, conditions and ecosystem types) and in the nature of the indicators (i.e., whether they are quantitative or descriptive). Quantitative indicators, which can be measured and reported on numerically, provide information mainly on the condition and functions of forests, and on the values or benefits associated with the goods and services that forests provide. (Examples of quantitative indicators are: area of forest and changes in forest area, volume of growing stock, and number of forest dependent species at risk.) Descriptive indicators, which call for qualitative assessments of progress, relate mainly to legal, institutional and policy instruments and conditions, and the extent to which these support the achievement of SFM. (Examples of descriptive indicators are: the existence of a legal/regulatory framework, and the extent to which it maintains forest resources and prevents forest degradation; and the existence and capacity to undertake and develop regular assessment of forest resources.)

[1] Please refer to http://www.fao.org/forestry/fo/fra/index_tables.jsp table 9 (forest management) for a list of countries.

Table 1. Major International Criteria and Indicator Processes

Process and Year Initiated	Region/Forest Types	Member Countries
African Timber Organization 1993	West and Central Africa	Angola, Cameroon, Central African Republic, Republic of Congo, Côte d'Ivoire, Democratic Republic of Congo, Equatorial Guinea, Gabon, Ghana, Liberia, Nigeria, Sao Tome et Principle, and Tanzania.
Dry Forest Asia 1999	South and Central Asia	Bangladesh, Bhutan, China, India, Mongolia, Myanmar, Nepal, Sri Lanka, and Thailand
Dry Zone Africa 1995	North, East and Southern Africa	Angola, Botswana, Burkina Faso, Cape Verde, Chad, Djibouti, Eritrea, Ethiopia, Gambia, Guinea Bissau, Kenya, Lesotho, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Senegal, Seychelles, South Africa, Somalia, Sudan, Swaziland, Tanzania, Uganda, Zambia, and Zimbabwe
International Tropical Timber Organization 1992	C&I initiatives cover humid tropical forests	The following ITTO member producer countries are involved in the ITTO C&I initiative: Bolivia, Brazil, Cambodia, Cameroon, Canada, Central African Republic, China, Colombia, Côte d'Ivoire, Democratic Republic of Congo, Ecuador, Egypt, Fiji, Gabon, Ghana, Guyana, Honduras, India, Indonesia, Liberia, Malaysia, Myanmar, Nepal, Panama, Papua New Guinea, Peru, Philippines, Republic of Congo, Suriname, Thailand, Togo, Trinidad and Tobago, Vanuatu and Venezuela
Lepaterique Process 1997	Central America	Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama
Montreal Process 1995	Temperate and boreal forests	Argentina, Australia, Canada, Chile, China, Japan, Mexico, New Zealand, Russian Federation, Uruguay and USA.
Pan-European Forest Process 1993	European forests	Albania, Andorra, Austria, Belarus, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, European Community, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Republic of Moldova, Monaco, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, San Marino, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, and Yugoslavia.
Tarapoto Proposal 1995	Amazon Forest	Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, and Venezuela
Near East Process 1996	Near East	Afghanistan, Algeria, Azerbaijan, Bahrain, Cyprus, Djibouti, Egypt, Islamic Republic of Iran, Iraq, Jordan, Kuwait, Kyrgyzstan, Lebanon, Libya, Malta, Mauritania, Morocco, Oman, Pakistan, Qatar, Kingdom of Saudi Arabia, Somalia, Sudan, Syria, Tadjikistan, Tunisia, Turkey, Turkmenistan, United Arab Emirates, and Yemen

(Source: FAO, 2001a)

Many countries have also developed sub-national criteria and indicators for SFM at the forest management level and other operational levels. The Center for International Forestry Research (CIFOR) has focused largely on research at the forest management unit level, assisting countries in field-testing. FAO, ITTO, IUCN, IUFRO, UNDP and UNEP, as well as non-governmental organizations, communities and the private sector have also supported work on the development and field testing of national and sub-national level criteria and indicators.

It is widely recognized that national goals defining what constitutes sustainable forest management will change over time to respond to shifts in values and increases in the understanding of forest ecosystems and their interaction with human communities and activities. Who makes the decisions is critical in any complex process that seeks to assess progress towards a desirable goal. This applies at multiple levels, including the management unit, national and regional levels. The general trend is toward multi-stakeholder participation. However, how this is accomplished varies from place to place. The IPF and IFF agreed that national forest programmes and other integrated programmes relevant to forests are appropriate mechanisms for defining national objectives and goals for the management of forest resources. Reference points for these goals will provide targets for the assessment of progress toward SFM using criteria and indicators.

To date, much of the effort in the international processes has centred on identifying and assessing indicators at the national level. Whether progress has been made toward SFM will be determined by assessing whether there has been progress towards sustainability, no change, or a movement in a negative direction in the indicators. Progress towards sustainability does not require that each indicator move in a positive direction. This is because there may be trade-offs that improve the degree to which the criterion is met, but which come at the expense of one or more indicators. In theory, the same process of aggregation and trade-off can apply when the complete set of criteria is assessed in an attempt to determine the trend towards SFM.

3. General Approach of C&I Processes

Although the nine C&I processes began at different times and vary to reflect priorities, conditions and forest ecosystem types in their member countries, the manner in which they are proceeding is similar. Within each process, individual countries are the driving forces, reporting on SFM using national data.

Each international C&I process took time to come to grips with the initial sets of criteria and indicators that were identified. In most cases, these were developed in a workshop or meeting attended by forest experts from member countries. Further evaluation of the criteria and indicators then followed. In the case of the Pan-European Process, a series of evaluations was conducted on the original set of indicators in 1994/95, 1999, and 2000 to evaluate their usefulness, strengths, weaknesses and feasibility. Workshops have also been held to consider improvements to the indicators.

Many of the processes (e.g. Montreal, Pan-European) have appointed technical committees to develop common definitions and measurement specifications for indicators, because it was found that definitions of key terms varied widely, as did measurement methodologies and standards. For example, material has been developed in the Pan-European Process on the assessment of data availability and reliability, sources of definitions for key terms, measurement units, periodicity of data collection and comments and observations (MCPFE, 2001).

Some of the regional groups have issued guidelines related to MAR, reporting formats and a schedule for the initial regional report. For example, the Near East Region guidelines provide, for each indicator, the purpose of the indicator, a description of potential measurement methodologies and units and suggested measurement periodicity (FAO/UNEP, 2000). Regional organizations, institutions and instruments have played a coordinating role, organized meetings and workshops related to key issues, shared experiences and published progress reports.

At the national level, many countries have established working groups to assess the applicability of the regionally agreed indicators and consider how the national processes might work. Few, if any, adopted the complete set of regionally agreed indicators for national reporting, determining that some needed revision before they could be applied, others were not relevant and new ones should be added. As a second step, countries identified those indicators that (a) could readily be measured; (b) required some effort or additional resources; and (c) needed more research before an assessment could be made. Those indicators that fall into the first category usually consist of area-based indicators, growing stock, wildlife species, volume and value of harvest of forest products.

Because SFM extends the notion of forest management beyond that which is covered by parameters of traditional "sustained yield management", monitoring a full set of C&I requires substantial resources and new knowledge. Moreover, since SFM needs to address cross-sectoral issues related to such areas as water quality, deposition of air pollutants, employment, food security, traditional knowledge and gender-based participation, new links between forestry and other sectors are being forged in many countries. Government departments and agencies outside the forest sector thus are looked to for information, in particular that related to social and environmental functions of forests.

Numerous countries have developed specific initiatives to implement C&I, some of which may be components of a broader national forest programme or other integrated strategy, or are supported by new or amended legislation. The structure depends, in part, on which level of government is responsible for forest management and on the degree to which power is centralized. Private ownership also has a profound influence on the approaches to implementing C&I.

In many countries, criteria and indicators for the forest management unit level have also been developed. The development of forest management unit level processes is also driven, in part, by the desire of communities to have sustainably managed local forests as well as by the interest in companies and sub-national governments to either certify the forest as being sustainably managed or regulating management so that it is sustainable. Typically, local level C&I and management unit level C&I are developed from national or regional sets.

4. Availability of Data and Information

This section summarizes information available at the regional and global levels on biophysical and socio-economic parameters of forests and on forest policies, legislation and institutional frameworks.

4.1. Data availability (and gaps) by criterion and indicator

Some regional processes have assessed the information that may be used to measure or describe SFM indicators. Reports that summarize these assessments include UNEP/FAO (1998) for Dry Zone Africa; FAO/UNEP (1999) for the Near East; and Montreal Process (2000), which builds upon an interim assessment of carried out in 1995. A recent draft report by the Pan-European Liaison Unit (2001) summarizes data availability and reliability for indicators associated with the criteria, *Forest health and vitality*, *Biological diversity* and *Protective functions*, and the same for the process' other three indicators is expected to be forthcoming in 2002.

Assessments from the above-noted reports have been compiled by FAO, and the results are provided below and shown in annex 2. The unpublished summary represented in annex 2, include all indicators, but groups those that are similar or identical. Aggregated regional data

were provided for Dry Zone Africa, the Near East, and Pan-European Processes in the source documents, whereas country specific data were provided for a few member nations of the Montreal Process. The assessments for the Near East and Dry Zone Africa Processes are no longer current, although they represent the most recently published data. Members may now have access to updated data.

A number of general conclusions may be drawn. First, countries are able to report on a number of indicators associated with all criteria. Most countries have data on traditional forest management and economic aspects (e.g., extent and condition of forests, economic output and employment, balance of removals and growth) and on forest dependent species and those at risk. Furthermore, while annex 2 shows that relatively little information is available under the criterion, *Political, legal and institutional frameworks* (whose indicators are generally descriptive rather than quantitative), data for some indicators, such as those pertaining to the legal framework and management plan specifications, are readily available for reporting purposes. For example, the FAO Legal database (FAOLEX), located at http://faolex.fao.org/faolex/index.html, is a global database that contains a wealth of information on legal texts related to forests, many of which are available on-line. In addition, the regional national forest programme updates prepared by FAO regional offices, as well as the CSD national information system, contain useful information on recent policy developments.

It should also be noted that indicators related to the criterion, *Political, legal and institutional frameworks*, are structured and reported in different ways in the international C&I processes. For example, in the Pan-European Process, these indicators are spread under each of the six criteria, whereas in many other processes, they are compiled under a specific criterion, (e.g. criterion seven of the Montreal Process: legal, institutional and economic framework for forest conservation and sustainable management).

Almost all countries are able to assess indicators of the extent of forests and growing stock volume. In many cases, these data are available by forest type (e.g. natural forest and forest plantation; coniferous and broad-leaved forest) and sometimes by age class. These indicators are strongly relevant to the *Biological diversity* and *Extent of forests* criteria and moderately relevant to the *Production functions*, *Protection functions*, and *Health and vitality* criteria.

Some countries routinely assess the impacts of insect, disease, and fire losses, especially where the impacts cause widespread mortality. These monitoring functions provide data related to indicators of forest health and vitality and also contribute to the maintenance of forest extent and growing stock data. Data are less available and less reliable where disturbance agents cause reductions in growth or partial mortality (e.g. an insect attacks one species in a mixed wood forest) and for non-traditional threats such as pollution and ultraviolet radiation.

Indicators of biological diversity (particularly at the species and also at the ecosystem level) are reasonably well reported, at least where risks have been identified. Biological diversity, like SFM, is a relatively new, multi-dimensional term that forest resource managers are grappling with, especially in terms of the data requirements to fully assess biological diversity and the implementation of conservation practices on the ground. Where indicators are based on an assessment of protective systems or practices, data availability is poor.

Foresters have long been concerned with the maintenance of timber production capacity, and wildlife managers have also long been concerned with the provision of game. In many countries, however, these interests dominated forest resource management for many years, often to the

exclusion of concerns related to other species. As a result, data on non-commercial timber species and non-game species is often poor or non-existent.

Indicators associated with the criterion, *Protective functions of forests*, are generally more difficult to assess and, consequently, data availability is lower. One of the main issues is that the indicators tend to suggest that protection is undertaken for a single reason, whereas that is often not the case. For example, areas with steep slopes are often scenic and may also have watercourses associated with them, providing a number of reasons to protect them. Similarly, riparian forests protect water quality from sedimentation, protect soils from erosion and frequently are important wildlife habitats.

There tends to be good information on employment and wood production as well as on the value of some non-timber products. However, the indicators that are more strongly related to social and cultural values tend not to be reported. These data will also be expensive and difficult to obtain, and may not lend themselves to national level reporting as well as they do to local level reporting.

While many indicators can be assessed using area data, it is important to note that these data provide only a limited amount of information about the quality of forests. GIS analysis can add value to a digital spatial database by investigating patch characteristics, connectivity and fragmentation, wildlife habitat for some species and road density. However, aspects of forest quality, such as populations of wildlife, herbaceous plants small organisms and stand structure are not detectable using area data or GIS analysis. Habitat estimates are often non-existent for many species. Moreover, just because the habitat exists does not mean that the species will be present; often areas of good habitat attract hunters, and may result in exploitation.

4.2. National reporting and other sources of information

There are numerous national reporting processes already in place, in addition to those being carried out under some C&I processes. Synchronizing these can help streamline efforts and lower costs associated with reporting. National reporting of forest-related information and data to global and regional organizations and instruments are listed in annex 3, and can be grouped into three categories:

- quantitative data (e.g., forest area, extent of protected areas, value of wood products);
- descriptions of major forest management issues and activities to address them; and
- descriptions of progress in implementing C&I and other initiatives related to SFM.

Annexes 4 and 5 relate the information and data contained in these sources to the criteria and indicators identified by the nine international processes.

National level reporting related to forests is asked for under a number of international conventions, instruments and bodies, among which are the Convention on Biological Diversity (CBD), Convention to Combat Desertification (CCD), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), United Nations Framework Convention on Climate Change (UNFCCC), World Heritage Convention (WHC), and the Commission on Sustainable Development (CSD).

In addition, countries are asked to provide information on forests to various organizations and instruments. Global data bases on forest-related subjects are maintained by FAO (including the Global Forest Resources Assessment – FRA), Global Observation of Forest Cover (GOFC), International Tropical Timber Organization (ITTO), International Union of Forest Research Organizations (IUFRO), Joint Research Centre European Commission, United Nations Economic

Commission for Europe (UN-ECE), United Nations Environment Programme (including UNEP-World Conservation Monitoring Centre), World Conservation Union (IUCN), the World Resources Institute and the World Bank (see annex 3 for a listing of the data bases).

Many countries maintain databases, some of which are on-line, that provide national data and information that can be used to provide values of indicators. At this point, few of the international and regional databases and reports have direct electronic linkages to the national databases. Instead, countries respond to questionnaires to provide data (e.g. FRA) or submit reports based on commitments. It is technically feasible, however, to link a series of web-based databases electronically, as well as to be able to access and input information from a remote station. These technological advances provide a great potential opportunity for information sharing and dissemination if organizational obstacles can be overcome.

Lest one think that using data from national reports and national, regional and global databases will minimize the work involved in forest-related monitoring, assessment and reporting activities, it is important to bear in mind some of the lessons that FAO learned while undertaking the global Forest Resources Assessments of 1990 (Singh, 1996) and 2000 (FAO, 2001b). One of the critical limiting factors in carrying out these global forest resources assessments was the relative lack of reliable data, especially in developing countries. Even though developed countries tend to have more accurate data, the quality and quantity of data vary considerably between countries, and several gaps exist. Thus, even though many countries indicated that they have data pertaining to a large number of indicators, if the data are unreliable, so too will be the assessments and reports. In addition, standards and definitions often differ from country to country. Use of commonly agreed standards and definitions would be the most efficient way to ensure compatible sets of data, but, failing that, procedures for adjusting data from different countries to common reference points would be required in order to prepare regional assessments. Without this, regional or global assessments would be heavily qualified. However, despite these caveats, MAR activities can be significantly improved and simplified by coordinating and streamlining data and information collection and reporting. For example, data from national reports on a number of indicators of the Pan-European Process have been used in the Global Forest Resources Assessment 2000 (Nyyssön & Ahti, 1996).

5. Development of Monitoring, Assessment and Reporting Guidelines by the International C&I Processes

As C&I for SFM are implemented, the methods and standards used to measure or evaluate indicators become more precise. Reporting guidelines are being developed. Regional processes are being supplied with data collected at the national level. The nature of the assessment process, however, is relatively less well explored, in part due to the tremendous sensitivity involved.

The technical guidelines for the assessment and measurement of criteria and indicators for SFM in Dry Zone Africa (UNDP/FAO, 2000b) represent a good example of data collection guidelines being developed for many regional processes. These provide a statement of the intent associated with each indicator, discussion of how certain possible outcomes could be interpreted, and a description of methods that can be used to measure or assess the indicator. (Note that the term "assess" is sometimes used in the sense of providing data or information to determine an indicator's status. This differs from the meaning of "assess" used in this paper, which describes how one determines the progress towards, or level of, sustainable forest management.) The guidelines also suggest units of measure and how the data might be presented (e.g. as a value or percentage). The choice of the monitoring cycle should balance the cost and effort associated

with measurement, expected rates of change, and the value of having up-to-date information. Of the fifty indicators described in the guidelines for Dry Zone Africa, seventeen are recommended to be monitored annually, twenty-seven every five years, and the remaining six every ten years. The indicators that are to be evaluated annually tend to be related to employment and economic production, which are frequently measured each year, and those that assess characteristics especially vulnerable to exploitative pressure. Many of the area-based indicators are to be measured every five years, since these do not change very quickly. In addition, a five-year monitoring cycle is advocated for all of the indicators of the criterion, *Adequacy of legal, institutional, and policy frameworks for sustainable forest management*, as well as many other descriptive indicators.

As mentioned previously, similar guidelines with the same objectives to those developed under the Dry Zone Africa Process, have been published for the Near East region. Guidelines for the Lepaterique Process of Central America and for the Regional Initiative for the Development and Implementation of National Level Criteria and Indicators for the Sustainable Management of Dry Forests in Asia are in press.

The Montreal Process has established a Technical Advisory Committee to develop definitions of terms and rationale statements for all indicators, to consider data collection approaches for all indicators, and to consider approaches to assembling, compiling and reporting indicators derived from sub-national data. It was agreed at the Tenth Meeting of the Working Group (October 1998, Moscow) to publish a set of "technical notes". For each indicator, there would be a rationale statement, definition of key words, and suggested approaches for measuring the indicator. At the 12th Meeting of the Montreal Process (Beijing, November 2000), the Working Group agreed to the guidelines, outline and format for the First Montreal Process Forest Report, which will be published in 2003.

ITTO has carried out activities intended to facilitate producing member countries' efforts in implementing criteria and indicators at the national and forest management unit levels (ITTO, 1999a and ITTO, 1999b). ITTO organized an Expert Panel, which provided elements for the development of an auditing system for sustainable forest management at both levels. Once in full operation, the system should help countries evaluate their forest management performance through the use of criteria and indicators and, at the same time, enable them to determine progress towards sustainability, improve their forest management practices, and facilitate information sharing among interested parties (ITTO, 2000).

6. Status of Reporting under the International C&I Processes

Some of the regional C&I processes (i.e., the Montreal, Pan-European and ITTO) are or will soon report as a process, giving an overview of the progress towards SFM in their respective eco-regions. Other international processes, however, have not made any decision on whether to report as processes and/or to have a common format for reporting.

The Pan-European Process has reported on progress towards SFM at the Pan-European level twice: the first time in 1995 in the form of an interim report (while at the same testing the applicability of the pan-European indicators), and the second time in 1998 at the third Pan-European Ministerial Conference on the Protection of Forests in Europe (Lisbon). For the 1998 report, the data for quantitative indicators was collected for the Global Forest Resources Assessment (temperate and boreal component), complemented by additional national reports that provided information on descriptive indicators. Both times, a set of definitions and guidelines for reporting were used. Currently the Pan-European Process is working on improving the indicators.

As mentioned above, the first report of progress under the Montreal Process will be published in 2003. There will be an overview report and a set of accompanying national reports. The overview report will be a summary of the national findings, especially trends in national indicators, although not all indicators identified within the process may be reported on. For each indicator being reported, a definition should be given, the measurement approach described, and the longest relevant data set used to identify trends.

It is widely recognized that, for a number of indicators, reporting guidelines leave a lot of room for creativity. The Montreal Process Year 2000 Progress Report (The Montreal Process Liaison Office, 2000) states that "the challenge [in using qualitative data] is to convey a sense of whether conditions are improving, decreasing, or being maintained. Qualitative data is often subject to different interpretations. ... Qualitative illustrations should be amplified with descriptive examples." Where no suitable national data are available, information such as case study reports, peer reviewed professional opinion, etc. would be appropriate.

Providing an overview of criteria and indicators at the eco-regional level raises some issues that don't exist at the national level. Because each international C&I process relies on data and assessments produced by individual countries, the primary concern is data quality, completeness and consistency among them. Member countries could be relied upon to follow the guidelines, but checking to ensure consistency and quality of data would help strengthen the credibility of the process. This might be done by administrative officials of the process or, alternatively, by a neutral third party, such as a multi-stakeholder task force.

7. Obstacles to Monitoring, Assessment and Reporting through the C&I Processes

There are a number of obstacles to the implementation of C&I processes for sustainable forest management, many of which are widely recognized. Some of these have been highlighted in discussions by countries in the Near East and Dry Zone Africa Processes (UNEP/FAO, 1998 and UNEP/FAO, 2000a, respectively).

The costs of developing a set of baseline data and carrying out subsequent monitoring is an obstacle for both developed and developing countries. For example, a 1996 survey by the US Forest Service concluded that only nine of the sixty-seven national level indicators in the Montreal Process could be assessed at present, and another 20 - 25 could be evaluated given additional funding. Funding limitations are most acute in developing countries. This points to the need for countries to prioritize the implementation of indicators, according to, for example, the degree of relevance of the indicator to the related criterion, the measurability of the indicator, the cost of its measurement, and its responsiveness to change. Many countries have already done this, and many are also looking at ways of sharing the cost, including through joint projects and technology transfer. For example, cooperative arrangements have sprung up between the Southern Cone countries within Montreal Process and the Southern Africa Development Community (SADC) and Permanent Interstate Committee for Drought Control in the Sahel (CILSS) countries in the Dry Zone Africa Process. Developing countries have also stressed the value of external assistance, including capacity building, and its importance in maintaining momentum. On the longer term, research on different approaches for measuring indicators can also provide assistance. However, it would also not be a surprise to see a gradual reduction in the number of indicators that are required to adequately assess SFM. The current set of indicators attempts to address the full range of values and attributes of SFM. It is possible, however, that as further experience with C&I is gained, a number of indicators will emerge as a core set, while others will be revealed to be redundant, ambiguous, or too expensive or difficult to monitor.

A second obstacle, which is common in many countries, is a lack of understanding or commitment at the political level, which translates into lack of political support. This affects the resources made available within a country for participating in the process and may also undermine the legal backing for both implementing SFM and monitoring, assessing and reporting on it.

The lack of consistent definitions, standards and measurement methods at sub-national and sub-regional levels has been discussed above. While this is not an insurmountable obstacle, it does prevent meaningful regional and global assessments, because of the resulting difficulties of harmonizing information so that it can be aggregated. FRA 2000 requested all countries to provide forest data based on a single definition of "forest", but in many cases, the information provided had to be adjusted so as to conform to this definition before national level data on forest area could be input into the global database (FAO, 2001b).

A fourth concern is the lack of a strong scientific basis for some indicators. For example, for many biodiversity indicators it is very difficult to determine the range of natural variation with any real confidence. Furthermore, given the extent of human influence on the forest, including such profound impacts as changes in atmospheric composition and climate, it is not clear that all indicator values should necessarily remain within the range of natural variation. In any event, there are many scientific uncertainties present in the sets of indicators that have been selected and it is likely that a number of indicators will be revised over time. While the technical experts are comfortable with making changes as science improves, the uncertainty around the science of an indicator should play a role in determining the priority attached to implementing the indicator.

Finally, there are longer-term issues related to descriptive indicators. While these can be assessed at a given point in time, it may prove to be difficult to develop credible assessments of change over time. Furthermore, it will be important to resist the natural inclination of decision-makers, who will likely make the assessment, to believe, without sufficient foundation, that things have improved.

8. Conclusions and Some Key Related Issues

The UNFF has agreed, as part of its MAR function, to monitor, assess and report on progress toward sustainable forest management. A common global vision of what constitutes SFM is represented by the criteria identified by the nine international C&I processes. These processes involve about 150 countries and cover most of the forests of the world. In addition to the seven elements of SFM common to the nine processes, many process-specific indicators of SFM have been identified. Many of these are quantitative, while others, including those related to political, legal and institutional frameworks, are descriptive.

Most countries participating in these nine processes have made important progress in the implementation of C&I for sustainable forest management. Not surprisingly, there is a great deal of variability among countries and processes in the degree of progress made, reflecting differences in starting points, resource availability, political commitment and duration of involvement with C&I. However, most countries have developed a preliminary list of indicators that apply at the national level, have prioritized these, and have begun the process of compiling available data.

The international C&I processes themselves are at different stages in terms of reporting. National reporting, and even some regional reporting, have already been carried out under some of the

processes, whereas others are at the stage of developing guidelines for reporting. The compatibility of the processes has, however, been discussed on many occasions.

A variety of sources of national information related to indicators of SFM exist (e.g., national forest information systems, national reports to international conventions and bodies, and national C&I reports to some of the international processes). Some forest-related information has been compiled at the global level, but most of this is limited to quantitative data on biophysical or economic aspects of forests (e.g, FAO's Forest Resources Assessment; UNEP-WCMC's data related to biological diversity; and various databases on forest products). There are clearly significant gaps in the information base as well as difficulties related to differences in forest-related definitions and in methodologies of data collection, which limit the feasibility of aggregating data among countries.

The C&I processes provide a widely accepted framework for assessing progress toward sustainable forest management at the national level, and some processes (e.g. Pan-European and Montreal) are using national C&I reports to provide a picture of progress toward SFM at the regional level. The question is how the framework provided by the nine ongoing C&I processes may be used to assess global progress toward SFM for the purposes of UNFF.

The question of how the C&I framework may be useful to the UNFF's MAR function raises a few key issues.

First, it seems essential that a clear picture of what countries expect to gain from the UNFF's effort on monitoring, assessment and reporting on progress toward SFM effort should emerge before detailed discussions on how to and what to monitor, assess and report can proceed. Having a common vision of the primary purpose of the MAR function will help countries decide on such things as the kinds of indicators to report upon to UNFF and the periodicity of reporting. Take, for example, the following two possible primary objectives:

- To identify the contributions that the UNFF can make (i.a., through intergovernmental activities and efforts by international organizations and instruments, regional processes, and other major groups) to support countries' efforts to work towards SFM. If the primary purpose of MAR were to define needs, gaps and opportunities that can be addressed by the UNFF, then reporting on descriptive indicators (that call for action-oriented responses), are likely to be more meaningful than reporting on quantitative indicators (that give a picture of status and trends in forests).
- To monitor and assess progress toward SFM through providing periodic overviews of the status and trends of the world's forests and forest resources. If this were the primary objective, then reporting on quantitative indicators (and building upon existing global databases) may well be more relevant.

A second issue relates to the degree to which national reporting to the C&I processes can be used for reporting to the UNFF. Certainly, a variety of options exist. Two possible broad approaches to reporting to the UNFF are indicated below for the purposes of illustration and to highlight some of the considerations that may influence the UNFF's decisions.

- Reporting to the UNFF on progress toward SFM might be done by the international C&I processes themselves, using national reports submitted to each process. Under such a system, each C&I process would forward national C&I reports to the UNFF, along with any relevant summaries or analyses (e.g. a regional report). In this case,

countries would not report directly to the UNFF on progress toward SFM. This would help streamline reporting. The varying stages of development of the international C&I processes in reporting, however, is a consideration. National reporting has not commenced in some processes, and not all processes have yet considered reporting at a regional level. Further development of reporting under regional processes would be necessary before this approach could be feasible.

- National reporting to UNFF might be done on a set of criteria and indicators chosen from among those identified by the international C&I processes. This would offer the possibility of aggregating national level information to give a global picture of progress toward SFM. Two key considerations affect the feasibility of this option: differences of opinion as to the validity of aggregating national level assessments of progress toward SFM to give a global assessment of progress; and divergent views on the validity of a identifying a core set of indicators. As to the latter, one view is that all C&I are important, and the other view is that it would be possible to identify a limited number of diagnostic indicators that could provide an adequate overview of progress toward SFM.

Third, the paper has drawn attention to issues related to the availability and accessibility of information related to C&I. While progress has been made in terms of national capabilities to monitor C&I, considerable obstacles remain in most countries. A more complete analysis of the gaps and weaknesses in forest-related information and options to improve both the information base and the dissemination of existing information, would help to identify areas where UNFF may have a positive impact. For example, opportunities may emerge for international agencies to provide assistance in strengthening national capacity in data collection and analysis and in making information more easily and readily accessible.

Lastly, as discussions on options for monitoring, assessment and reporting of progress toward SFM through the UNFF proceed, it is expected that two categories of possible actions will be identified: those which can be implemented immediately, and those which will require a longer-term effort to put into effect. Plans for developing the UNFF MAR function may well include both kinds of actions.

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Annex 1: Criteria of Sustainable Forest Management identified by the Nine International C&I Processes

Common elements of sustainable forest management represented by the criteria of the nine processes:
1. Extent of forest resources and global carbon cycle
2. Forest ecosystem health and vitality
3. Biological diversity in forest ecosystems
4. Productive functions of forests
5. Protective functions of forests
6. Socio-economic functions and conditions
7. Political, legal and institutional framework indicators

C&I Process	No.	Criterion or Principle
ATO	0	Sustainability of the forest and its multiple functions is a high political priority
	I	Areas devoted to forestry activities or the permanent forest estate are not declining
	II	Forests are adequately managed and developed irrespective of their role
	IIA	Sustainable timber production (in quantity and quality) is guaranteed
	IIB	Sustainable production of non-timber forest products is ensured
	III	Main ecological functions of the forest are maintained
	IV	Rights and duties of all stakeholders should be clearly defined, perceived and accepted by all
Dry Forest in Asia	1	Extent of forest and tree cover
	2	Maintenance of ecosystem health and vitality
	3	Maintenance and enhancement of bio-diversity
	4	Conservation and enhancement of soil and water resources and other environmental functions
	5	maintenance and enhancement of forest productivity
	6	Extent of forest resource utilization
	7	Socio-economic, cultural and spiritual needs
	8	Policy, legal and institutional framework
Dry Zone Africa (CILSS)	1	Maintenance and improvement of forest resources including their contribution to global carbon cycles
	2	Conservation and enhancement of biological diversity in forest ecosystems
	3	Maintenance of forest ecosystem health, vitality and integrity
	4	Maintenance and enhancement of productive functions of forests and wooded lands
	5	Maintenance and improvement of protective functions in forest management
	6	Maintenance and enhancement of socio-economic benefits
	7	Adequacy of legal, institutional and policies frameworks for sustainable forest management
Dry Zone Africa (SADC)	1	Development, maintenance and improvement of forest resources, including their contribution to global carbon cycles
	2	Conservation and enhancement of biological diversity in forest ecosystems
	3	Maintenance and enhancement of forest ecosystem health and vitality
	4	Maintenance and enhancement of productive functions of forests and other wooded lands
	5	Maintenance and improvement of environmental and conservation functions of forests and other wooded lands and combating desertification
	6	Maintenance and enhancement of socio-economic benefits of forests and other wooded lands
	7	Adequacy and effectiveness of legal, institutional and policies frameworks for sustainable forest management

ITTO	1	Enabling conditions for sustainable forest management
	2	Forest resource security
	3	Forest ecosystem health and condition
	4	Flow of forest produce
	5	Biological diversity
	6	Soil and water
	7	Economic, social and cultural aspects
Lepaterique (Regional Criteria)	1	Existence of a legal, political, institutional technical and socio-economic framework which promotes and guarantees sustainable forest management and conservation of the resources
	2	Conservation and maintenance of environmental services provided by forest ecosystem
	3	Maintenance of productive capacities of forest ecosystems
	4	Maintenance and enhancement of multiple socio-economic and cultural benefits of forest ecosystems to meet the needs of all levels of society
Lepaterique, cont. (National Criteria)	1	Existence of a legal, political, institutional, technical and socio-economic framework which promotes and guarantees the sustainability of forest management and the conservation of the forest resources
	2	Forest cover
	3	Forest health and vitality
	4	Contribution of forest ecosystems to environmental services
	5	Biological diversity in forest ecosystems
	6	Productive functions of forest ecosystems
	7	Scientific and technological capacities for the development of the forest resource
	8	Maintenance and improvement of the multiple socio-economic and cultural benefits of the forest ecosystems required to attend the needs of society in general
Montreal	1	Conservation of biological diversity
	2	Maintenance of productive capacity of forest ecosystems
	3	Maintenance of forest ecosystem health and vitality
	4	Conservation and maintenance of soil and water resources
	5	Maintenance of forest contribution to global carbon cycles
	6	Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of societies
	7	Legal, institutional and economic framework for forest conservation and sustainable management
Pan-European	1	Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles
	2	Maintenance of forest ecosystem health and vitality
	3	Maintenance and encouragement of productive functions of forests (wood and non-wood)
	4	Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems
	5	Maintenance and appropriate enhancement of protective functions in forest management (notably soil & water)
	6	Maintenance of other socio-economic functions and conditions
Tarapoto (I. National level)	1	Socio-economic benefits
	2	Policies and legal institutional framework for sustainable development of forests
	3	Sustainable forest production
	4	Conservation of forest cover and of biological diversity
	5	Conservation and integrated management of water and soil resources
	6	Science and technology for the sustainable development of the forests
	7	Institutional capacity to promote sustainable development in Amazonía

Tarapoto, cont. (II. Management unit level)	8	Legal and institutional framework
	9	Sustainable forest production
	10	Conservation of forest ecosystems
	11	Local socio-economic benefits
Tarapoto, cont. (Global Services)	12	Economic, social and environmental services performed by Amazonian forests
Near East	1	Extent of forest resources
	2	Conservation of biological diversity in forest areas
	3	Health, vitality and integrity
	4	Productive capacity and functions
	5	Productive and environmental functions
	6	Maintenance and development of socio-economic functions and conditions
	7	Legal and institutional frameworks

Source: FAO, 2001a.

Annex 2 - Assessment of Availability of Information Carried Out by the Pan-European, Montreal, Near East and Dry Africa Processes[2]

Criterion 1: Extent of Forest Resources and Global Carbon Cycle

Indicator	Pan-European	Montreal (some countries)				Near East	Dry Africa
		Australia	Chile	China	Japan		
Area of forest cover	Report of assessement of data availability expected in 2002	A	A	A	A	A	A
Wood growing stock		A		B	A	A	A
Rate of conversion of forests to other uses		A				A	
Sucessional stage		A	B	B	A		
Age structure		A	B	B	A		
Carbon stocking/balance		B		B	A		

Criterion 2: Forest Ecosystem Health and Vitality

Indicator	Pan-European	Montreal (some countries)				Near East	Dry Africa
		Australia	Chile	China	Japan		
Insect/disease damage	A			B	A	A	A
Fire and storm damage	B – C			B	A	A	A
Wild animal damage	C					B	A
Deposition by air pollutants	A			A			
Damage by wind erosion							
Incidence of defoliators						C	
Reproductive health							
Competition from introduction of plants						C	A
Nutrient balance and acidity	B						B
Trends in crop yields						A	A

[2] Note: see last page of this annex for explanation of the processes and coding system

Criterion 3: Biological Diversity in Forest Ecosystems

Indicator	Pan-European	Montreal (some countries)				Near East	Dry Africa
		Australia	Chile	China	Japan		
Extent of protected areas	B	A	A	B	A	A	A
No. Forest dependent species at risk	A	A	A	A		B	B
Area and distribution of different forest ecosystems		A	A	B	A	A	A
Forest fragmentation		B	B	C		A	B
Area and percentage of forest lands with ecological changes		C		B			
Number of forest dependent species		A	B	B		B	A
Reliance on natural regeneration							
Number of forest dependent species with reduced ranges			B	B		C	B
Area with endemic species cleared annually							
Forest fire control and preventive measures							
Resource exploitation systems used							
Measures *in situ* conservation of species at risk							

Criterion 4: Productive Functions of Forests

Indicator	Pan-European	Montreal (some countries)				Near East	Dry Africa
		Australia	Chile	China	Japan		
Percentage of forests/other wooded lands managed according to management plans	Report of assessement of data availability expected in 2002					A	A
Growing stock		A		B	A	A	B
Production of non-wood forest products						B	B
Wood production		A				A	
Annual balance between growth and removals of wood products		A	A		A	B	B
Level of diversification of sustainable forest production							
Degree of utilization of environmentally friendly techniques							

Criterion 5: Protective Functions of Forests

Indicator	Pan-European	Montreal (some countries)				Near East	Dry Africa
		Australia	Chile	China	Japan		
Soil conditions				B	A		
Water conditions		C		C			
Management for soil protection	B	A		B		A	A
Watershed management				C		A	A
Areas and percentage of forest lands managed for environmental protection	B – C			B		A	A
Areas managed for scenic and amenity purposes						A	B
Infrastructure density by FMU category							
Combating land degradation						B	

Criterion 6: Socio-Economic Functions and Conditions

Indicator	Pan-European	Montreal (some countries)				Near East	Dry Africa
		Australia	Chile	China	Japan		
Employment generation/conditions	Report of assessement of data availability expected in 2002	B		B		A	A
Value of wood products		B		B		A	C
Value of non-wood products		C		C		A	B
Value from biomass energy						B	A
Value from primary and secondary industries						B	B
Economic profitability of SFM							
Efficiency & competitiveness of forest products production, processing and diversification							
Degree of private and non-private involvement in SFM							
Local community information and reference mechanisms in SFM						B	A
Forest dependent communities		C				B	A
Impact of the economic use of forests on the availability of forests for local people		B					
Quality of life of local populations		C		B		C	B
Average per capita income in different forest sector activities							
Gender-focused participation in SFM						B	B

Criterion 7: Political, Legal and Institutional Framework Indicators

Indicators	Pan-European	Montreal (some countries)				Near East	Dry Africa
		Australia	Chile	China	Japan		
Legal framework that ensures participation by local government and private landowners		A		B		A	A
Technical and regulatory standards of management plans		A		B			
Cadastral updating of the FMU				B			
Percentage of investment on forest management for forest research		A		B			A
Rate of investment on FMU level activities – regeneration, protection, etc.				B			
Technical, human and financial resources				B		A	

Ranking System

For the Pan-European Process:
A - Data availability is high and scored a 5 out of a possible 5.
B - Data availability is moderate and scored a 3 or 4 out of a possible 5.
C - Data availability is low and scored a 1 or 2 out of a possible 5.

For Montreal Process countries included in the analysis:
A - can be measured immediately for most forests
B - require further work on methods or resourcing before indicators can be assessed
C - here significant research and development is required to develop practical, sensitive and cost-effective implementation

For the Near East Process:
A - applicable at country level and data can be collected in four or five countries.
B - applicable at country level and data can be collected in two or three countries.
C - applicable at country level and data can be collected in one or no countries.
(Note: If respondent was not sure whether data could be collected, response is ignored.)

For the Dry Zone Africa Process:
A - applicable at country level and data can be collected in nine - eleven countries.
B - applicable at country level and data can be collected in five - eight countries.
C - applicable at country level and data can be collected in four or less countries.
(Note: If respondent was not sure whether data could be collected, response is ignored.)

Sources:

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Montreal Process: Montréal Process Year 2000 Progress Report – Progress and Innovation in Implementing Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests. Obtained from website: http://www.mpci.org
Pan-European Process: Pan-European Process Liaison Unit. 2001. MCPFE AG Draft Recommendations for the Improvement of the Pan-European Indicators for Sustainable Forest Management for Criteria 2, 4, and 5. Prepared for the second MCPFE Workshop on the Improvement of Pan-European Indicators for Sustainable Forest Management to be held September 24 - 24, 2001 in Copenhagen, Denmark. Draft dated August 20. Vienna.

Annex 3: National Reports to International Conventions, International Organizations & Regional Organizations/Processes and Databases Related to Forests

PROVISIONAL LIST

Entity	National reports and databases, with website addresses	Periodicity / Base Year or Dates of Issue
Conventions, IPF/IFF Process and CSD Process		
Commission on Sustainable Development (CSD)	National Profiles[3] http://www.un.org/documents/	As decided by CSD Agenda / 1997, to be updated for the World Summit on Sustainable Development in 2002
	*National Report to CSD VIII (2000), Part V: Forests http://www.un.org/esa/agenda21/natlinfo/agenda21/issue/natur.htm#forest	every 4 years/ 1996, 2000
Convention on Biological Diversity (CBD)	Thematic Report on Forests http://www.biodiv.org/world/nr-guidelines.asp?lg=0 National Report to the Convention on Biological Diversity http://www.biodiv.org/world/nr-guidelines.asp?lg=0	As decided by COP Agenda / 2001 every 4 years / 1998, 2001
Convention to Combat Desertification (CCD)	UNCCD National Report http://www.unccd.int/cop/officialdocs/cop3/pdf/inf3eng.pdf	annually / 1999, 2000 (for some developed countries)
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	CITES Annual Reports All data from Annual Reports input directly into CITES Endangered Flora and Fauna Databases at: http://www.cites.org/eng/resources/	annually / 1998, 1999

3 A benchmark report compiled in 1997 from information already submitted to CSD.

UNFCCC	National Communication Annex 1 Countries: http://www.unfccc.int/text/resource/natcom/nctable.html#a1 Non Annex 1 Countries: http://www.unfccc.int/text/resource/natcom/nctable.html#nonannex1	annually / 1994-1998 (base yr not consistent for all countries)
World Heritage Convention (WHC)	Periodic Reporting on the Application of the World Heritage Convention http://www.unesco.org/whc/reporting/periodic.htm	every 6 years
International Organisations		
FAO	Forest Resources Assessment (FRA) http://www.fao.org/forestry/fo/fra/index.jsp FAO Yearbook of Forest Products see also: FAO/ECE/ITTO/OECD – Joint Questionnaire http://www.itto.or.jp/inside/joint_forest/index.html Non Wood Forest Products Database http://www.fao.org/forestry/FOP/FOPW/NWFP/nwfpdb-e.stm REFORGEN http://www.fao.org/forestry/fo/database/dbase-e.stm National reports to Regional Forestry Commissions on the status of the forest sector	every 10 years / 1980, 1990, 2000 annually every 2 years
UN-ECE/FAO	UN-ECE/FAO – Timber Bulletin http://www.unece.org/trade/timber/tc-publ.htm	annually

UNEP-WCMC	Forest and Drylands Program http://www.unep-wcmc.org/forest/datasets_maps.htm UNEP-WCMC/Flora and Fauna International – Global Trees Campaign Tree Conservation Information Service Database (TCIS) http://www.unep-wcmc.org/cgi-bin/SaCGI.cgi/trees.exe?FNC=database__Aindex_html Protected Areas Database http://www.wcmc.org.uk/protected_areas/data/nat.htm	
ITTO	Input to Year 2000 Objective Review http://www.itto.or.jp/inside/review2000/index.html ITTO Annual Review and Assessment of the World Timber Situation http://www.itto.or.jp/inside/review2000/index.html	annually
IUCN	2000 Red List of Threatened Species http://www.redlist.org/search/search-expert.php	
International Union of Forest Research Organisations (IUFRO)	SILVATERM http://iufro.boku.ac.at/iufro/silvavoc/svdatabase.htm	
Global Observation of Forest Cover (GOFC)	http://www.gofc.org/	
Regional Bodies		
Joint Research Centre European Commission	Tropical Ecosystem Environmental Observation by Satellite (TREES) Tropical Forest Information System (TFIS) http://www.gvm.sai.jrc.it/Forest/defaultForest.htm	

European Forestry Institute	European Forestry Information and Data Analysis System (EFIDAS) http://www.efi.fi/efidas/ Regional Forest Resource and Socio-Economic statistics in European Union countries http://www.efi.fi/efidas/	
Ministerial Conference for the Protection of Forests in Europe (MCPFE)	http://www.mmm.fi/english/forestry/policy/minkonf/[4]	
Pan-European Forest Process Criteria and Indicators for SFM	National reports http://www.mmm.fi/english/forestry/policy/minkonf/	every 4 years / 1994, 2000

[4] Quantitative information from national reports on the Pan-European Criteria and Indicators are reported through the FAO Forest Resources Assessment, 2000. Qualitative information from these national reports are availabel from the MCPFE.

Annex 4: National Reporting to International Conventions and Bodies Containing Forest Related Information

[I] Council on Sustainable Development National Report to CSD VIII, Part V: Forests: http://www.un.org/esa/agenda21/natlinfo/agenda21/issue/natur.htm#forest
[II] Thematic Report on Forests: http://www.biodiv.org/world/nr-guidelines.asp?lg=0
National Report to the Convention on Biological Diversity: http://www.biodiv.org/world/nr-guidelines.asp?lg=0
[III] Convention on Combatting Desertification National Report: http://www.unccd.int/cop/officialdocs/cop3/pdf/inf3eng.pdf
[IV] Convention on Illegal Trade of Endangered Species, CITES flora and fauna databases: http://www.cites.org/eng/resources
[V] International Tropical Timber Agreement (ITTA): Input to Year 2000 Objective Review : http://www.itto.or.jp/inside/review2000/index.html
[VI] Framework Convention on Climate Change: National Communication, Annex 1 Countries: http://www.unfccc.int/text/resource/natcom/nctable.html#a1
Non Annex 1 Countries: http://www.unfccc.int/text/resource/natcom/nctable.html#nonannex1
[VII] World Heritage Convention: Periodic Reporting on the Application of the World Heritage Convention: http://www.unesco.org/whc/reporting/periodic.htm

Criterion 1: Extent of Forest Resources and Global Carbon Cycle

Indicator	CSD[I]	CBD[II]	CCD[III]	CITES[IV]	ITTO[V]	UNFCCC[VI]	WHC[VIII]
Area of Forest Cover						X	
Wood Growing Stock						X	
Rate of Conversion of Forests to Other Uses						X	
Sucessional Stage							
Age Structure							
Carbon stocking/balance						X	

Criterion 2: Forest Ecosystem Health and Vitality

Indicator	CSD	CBD	CCD	CITES	ITTO	UNFCCC	WHC
Insect/Disease Damage							
Fire and Storm Damage						X	
Wild Animal Damage							
Deposition by Air Pollutants							
Damage by Wind Erosion							
Incidence of Defoliators							
Reproductive Health							
Competition from Introduction of Plants							
Nutrient Balance and Acidity						X	
Trends in Crop Yields							

Criterion 3: Biological Diversity in Forest Ecosystems

Indicator	CSD	CBD	CCD	CITES	ITTO	UNFCCC	WHC
Extent of Protected Areas							
No. Forest Dependent Species at Risk				X			
Area and Distribution of Different Forest Ecosystems						X	
Forest Fragmentation							
Area and Percentage of Forest Lands with Ecological Changes							
Number of Forest Dependent Species				X			
Reliance on Natural Regeneration							
Number of Forest Dependent Species with Reduced Ranges							
Area with Endemic Species Cleared Annually							
Forest Fire Control and Preventive Measures							
Resource Exploitation Systems Used				X			
Measures *in situ* Conservation of Species at Risk							

Criterion 4: Productive Functions of Forests

Indicator	CSD	CBD	CCD	CITES	ITTO	UNFCCC	WHC
Percentage of Forests/Other Wooded Lands Managed according to Management Plans						X	
Growing Stock					X	X	
Production of Non-wood Forest Products							
Wood Production					X		
Annual Balance between Growth and Removals of Wood Products					X	X	
Level of Diversification of Sustainable Forest Production							
Degree of Utilization of Environmentally Friendly Techniques							

Criterion 5: Protective Functions of Forests

Indicator	CSD	CBD	CCD	CITES	ITTO	UNFCCC	WHC
Soil Conditions			X			X	
Water Conditions							
Management for Soil Protection			X				
Watershed Management							
Areas and Percentage of Forest lands Managed for Envir. Protection							X
Areas Managed for Scenic and Amenity Purposes							X
Infrastructure Density by FMU Category							
Combating Land Degradation			X				

Criterion 6: Socio-Economic Functions and Conditions

Indicator	CSD	CBD	CCD	CITES	ITTO	UNFCCC	WHC
Employment Generation/Conditions			X				
Value of Wood Products		X			X		
Value of Non-Wood Products		X		X	X		
Value from Biomass Energy		X					
Value from Primary and Secondary Industries		X		X	X		
Economic Profitability of SFM				X			
Efficiency & Competitiveness of For. Products Production, Processing & Diversification					X		
Degree of Private and Non-private involvement in SFM			X				
Local Community Information and Reference Mechanisms in SFM		X	X			X	X
Forest Dependent Communities	X	X					
Impact of the Economic Use of Forests on the Availability of Forests for Local People	X	X					

Quality of Life of Local Populations	X		X				
Average per capita Income in Different Forest Sector Activities		X					
Gender-focused Participation in SFM			X				

Criterion 7: Political, Legal and Institutional Framework Indicators

Indicator	CSD	CBD	CCD	CITES	ITTO	UNFCCC	WHC
Legal framework that ensures participation by local government and private landowners	X	X	X			X	
Technical and regulatory standards of management plans	X		X				
Cadastral updating of the FMU							
Percentage of investment on forest management for Forest Research						X	
Rate of investment on FMU level activities – regeneration, protection, etc.			X				
Technical, human and financial resources		X	X			X	X

Annex 5 – Original Sources of Global and Regional Forest Database Information

Criterion 1: Extent of Forest Resources and Global Carbon Cycle

Indicator	FRA[i]	NWFP[ii]	FAOLEX[iii]	REFORGEN[iv]	YrBk[v]	GOFC[vi]	ITTO[vii]	IUCN[viii]	TREES[ix]	TCIS[x]	UNEP-WCMC[xi]	UN-ECE[xii]	PA[xiii]	EFIDAS[xiv]
Area of Forest Cover	X					X			X		X	X		
Wood Growing Stock	X													
Rate of Conversion of Forests to Other Uses	X					X								
Sucessional Stage														
Age Structure														
Carbon stocking/balance						X								

Criterion 2: Forest Ecosystem Health and Vitality

Indicator	FRA	NWFP	FAOLEX	REFORGEN	YBk	GOFC	ITTO	IUCN	TREES	TCIS	UNEP-WCMC	UN-ECE	PA	EFIDAS
Insect/Disease Damage											X	X		
Fire and Storm Damage	X					X								
Wild Animal Damage														
Deposition by Air Pollutants														
Damage by Wind Erosion														
Incidence of Defoliators														
Reproductive Health														
Competition from Introduction of Plants														
Nutrient Balance and Acidity														
Trends in Crop Yields														

Criterion 3: Biological Diversity in Forest Ecosystems

Indicator	FRA	NWFP	FAOLEX	REFORGEN	YrBk	GOFC	ITTO	IUCN	TREES	TCIS	UNEP-WCMC	UN-ECE	PA	EFIDAS
Extent of Protected Areas	X													
No. Forest Dependent Species at Risk				X				X		X				
Area and Distribution of Different Forest Ecosystems	X								X		X			
Forest Fragmentation	X													
Area and Percentage of Forest Lands with Ecological Changes						X								
Number of Forest Dependent Species	X			X										
Reliance on Natural Regeneration														
Number of Forest Dependent Species with Reduced Ranges														
Area with Endemic Species Cleared Annually														
Forest Fire Control and Preventive Measures						X						X		
Resource Exploitation Systems Used														
Measures *in situ* Conservation of Species at Risk				X										

Criterion 4: Productive Functions of Forests

Indicator	FRA	NWFP	FAOLEX	REFORGEN	YrBk	GOFC	ITTO	IUCN	TREES	TCIS	UNEP-WCMC	UN-ECE	PA	EFIDAS
Percentage of Forests/Other Wooded Lands Managed according to Management Plans	X											X	X	
Growing Stock	X				X		X							
Production of Non-wood Forest Products	X	X		X	X									
Wood Production	X				X		X							
Annual Balance between Growth and Removals of Wood Products	X				X		X							X
Level of Diversification of Sustainable Forest Production														
Degree of Utilization of Environmentally Friendly Techniques														

Criterion 5: Protective Functions of Forests

Indicator	FRA	NWFP	FAOLEX	REFORGEN	YrBk	GOFC	ITTO	IUCN	TREES	TCIS	UNEP-WCMC	UN-ECE	PA	EFIDAS
Soil Conditions														
Water Conditions														
Management for Soil Protection														
Watershed Management														
Areas and Percentage of Forest lands Managed for Envir. Protection	X										X		X	
Areas Managed for Scenic and Amenity Purposes													X	
Infrastructure Density by FMU Category														
Combating Land Degradation														

Criterion 6: Socio-Economic Functions and Conditions

Indicator	FRA	NWFP	FAOLEX	REFORGEN	YrBk	GOFC	ITTO	IUCN	TREES	TCIS	UNEP-WCMC	UN-ECE	PA	EFIDAS
Employment Generation/Conditions														X
Value of Wood Products					X		X							
Value of Non-Wood Products		X			X									
Value from Biomass Energy														
Value from Primary and Secondary Industries					X		X							X
Economic Profitability of SFM														
Efficiency & Competitiveness of For. Products Production, Processing & Diversification														
Degree of Private and Non-private involvement in SFM														
Local Community Information and Reference Mechanisms in SFM								X						
Forest Dependent Communities														
Impact of the Economic Use of Forests on the Availability of Forests for Local People														
Quality of Life of Local Populations														
Average per capita Income in Different Forest Sector Activities														
Gender-focused Participation in SFM														

Criterion 7: Political, Legal and Institutional Framework Indicators

Indicator	FRA	NWFP	FAOLEX	REFORGEN	YrBk	GOFC	ITTO	IUCN	TREES	TCIS	UNEP-WCMC	UN-ECE	PA	EFIDAS
Legal framework that ensures participation by local government and private landowners			X											
Technical and regulatory standards of management plans			X											
Cadastral updating of the FMU														
Percentage of investment on forest management for Forest Research														
Rate of investment on FMU level activities – regeneration, protection, etc.														
Technical, human and financial resources														

Other Databases that may be useful to MAR on forests:

Global Terrestrial Observing System (GTOS): a metadata search engine http://www.fao.org/gtos/
Silvaterm: searchable by forestry term, term equivalents, subject, language: http://iufro.boku.ac.at/iufro/silvavoc/svdatabase.htm

[i] FAO Forest Resources Assessment, http://www.fao.org/forestry/fo/fra/index.jsp
[ii] FAO Non Wood Forest Products Database, http://www.fao.org/forestry/FOP/FOPW/NWFP/nwfpdb-e.stm
[iii] FAO Forest Legislation Database: http://faolex.fao.org/faolex/index.html
[iv] FAO Forest Genetics Database: http://www.fao.org/forestry/fo/database/dbase-e.stm
[v] FAO Yearbook of Forest Products produced as result of Joint Questionnaire implemented by FAO, ECE, ITTO, OECD. http://apps.fao.org/page/collections?subset=forestry
[vi] Global Observation of Forest Cover: http://www.gofc.org/
[vii] ITTO Annual Review and Assessment of the World Timber Situation: http://www.itto.or.jp/inside/review2000/index.html
[viii] IUCN Red Lists of Endangered Species: http://www.redlist.org/search/search-expert.php
[ix] Joint Research Centre – EC, Tropical Ecosystems Environmental Observation by Satellite: http://www.gvm.sai.jrc.it/Forest/defaultForest.htm
[x] UNEP-WCMC Trees Conservation Information Service Database: http://www.unep-wcmc.org/cgi-bin/SaCGI.cgi/trees.exe?FNC=database__Aindex_html
[xi] UNEP-WCMC Dryland and Forests Program: http://www.unep-wcmc.org/forest/datasets_maps.htm
[xii] UN-ECE/FAO – Timber Bulletin: http://www.unece.org/trade/timber/tc-publ.htm
[xiii] UNEP-WCMC Protected Areas Database: http://www.wcmc.org.uk/protected_areas/data/nat.htm
[xiv] European Forestry Information and Data Analysis System: http://www.efi.fi/efidas/