



2. Setting the context

2.1 Background

2.1.1 The concept of sustainable forest management

Since the publication of the Brundtland report, *Our Common Future* (WCED, 1987), the principle of sustainable development has been widely recognized and defined as:

... development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987).

Although the principle of sustainability has been recently accepted, Wiersum (1995) argues that it has been accepted in forestry since the eighteenth century when early forest managers in Europe developed an understanding of natural forestry productivity and how it might be enhanced through silviculture to maintain a continuous supply of wood, game, and other products for human use and consumption. The concept was fundamentally driven by the desire to avoid the social and economic disruption associated with shortages of timber, whether for local use or as the basis for a community export economy. During the past century, the concept of sustainability in forestry has evolved to a greater depth and richness. Our vastly expanded understanding of the complex functioning of forest ecosystems, and a recognition of the full range and diversity of resources, values and ecological services that forests represent, has created new challenges and opportunities (Sample, 2004). Nowadays, sustainable forest management (SFM) has become a key concept that underpins modern forestry. It refers not just to the flow of goods and services but also to maintaining forest ecological processes essential for maintaining ecosystem resilience – the capacity of a forest ecosystem to recover following disturbance (Thompson et al., 2009). It relates to the *multiple uses and functions* of the forests (e.g., wood production, collecting non-wood forest products, recreation, protection of soil and water resources, biodiver-

sity conservation, carbon sequestration) and aims to maintain and enhance social, cultural, environmental and economic values of forests for the benefit of present and future societies. The new understanding of the concept became increasingly influential with the increasing rates of deforestation and degradation of the world's forests, and has become an integral component of international agreements and forest policy deliberations in the past two decades.

2.1.2 The international dialogue on world's forests

a. Sustainable forest management as an international challenge

In the political context, the concept of SFM was first set out at the United Nations Conference on Environment and Development (UNCED), often referred to as the Earth Summit, in Rio de Janeiro, in 1992. The discussions and negotiations were mainly focused on the management, conservation and sustainable development of forests and whether or not to launch negotiations for an international legally binding instrument for forests. However, attempts to agree on a forest convention failed, leading to the adoption of the Forest Principles (in full the “Non-Legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests”) and Chapter 11 of Agenda 21 on “Combating Deforestation”. In that context, the world governments declared:

... to support the management, conservation and sustainable development of all types of forests, both natural and planted, in all geographical regions and climatic zones (UNCED, 1992c).

They also called for the formulation of scientifically sound criteria and guidelines for the management and sustainable development of all types of forests. While discussions and agreements on forests have intensified since UNCED, a number of



international processes and initiatives (e.g., ITTO¹, FAO², UNFF³) have been launched upon the need to define what constitutes SFM and how to monitor and assess its progress. Although there is no single universally agreed definition of SFM the most widely, inter-governmentally agreed definition is the one adopted by the General Assembly of the United Nations in December 2007:

Sustainable forest management, as a dynamic and evolving concept, aims to maintain and enhance the economic, social and environmental value of all types of forests, for the benefit of present and future generations (UNFF, 2007).

The elements [of sustainable forest management] are: (i) extent of forest resources; (ii) forest biological diversity; (iii) forest health and vitality; (iv) productive functions of forest resources; (v) protective functions of forest resources; (vi) socio-economic functions of forests; and (vii) legal, policy and institutional frameworks (UNFF, 2007).

Similarly, a number of regional initiatives have been established in Africa, Central America, the Amazon basin, Asia and Europe, e.g., Helsinki Process for Europe (1993), Montréal Process for North America (1993), Tarapoto Process for the Amazon (1995), and the African Timber Organization's Criteria and Indicators (1996). Despite the broad debates and varying definitions of SFM in the different processes worldwide (e.g., ITTO, FAO, Montréal process, MCPFE⁴, Tarapoto, UNFF), often there is a common reference to the environmental, social and economic values and uses of the forests.

In the pan-European context, the term was defined conceptually in a political context at the Second Ministerial Conference of Protection of Forests in Europe (MCPFE) in Helsinki in 1993:

“Sustainable management means the stewardship and use of forests and forest lands in such a way, and at a rate, that maintains their biodiversity, productivity, regenera-

tion capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems.” (Helsinki 1 Resolution, MCPFE, 1993)

The pan-European definition, as many others, emphasizes the multiple functions of the forests and can be characterized as the maintenance of balance between society's increasing demands for forest products and benefits, and the conservation of forest health and biodiversity.

The importance of the social, economic, environmental, cultural and spiritual aspects of forests have been emphasized in many efforts through which international and national organizations seek both political understanding and the practical means and ways to sustainably manage all types of forests. These efforts include, among others, the development of guidelines and criteria and indicators, which have contributed to a better understanding of what SFM actually means (ISCI, 1996).

b. The International forest regime

The debate on the conservation and sustainable management of forests as well as on the question of an international legal instrument for forests takes place in various processes and initiatives which are jointly called the “*international forest regime*”. This includes global and regional processes, international and multi-lateral organizations as well as the three Rio Conventions: (i) the United Nations Framework Convention on Climate Change (UNFCCC), (ii) the Convention on Biological Diversity (CBD) and (iii) the United Nations Convention to Combat Desertification (UNCCD). While the international community failed to reach consensus on the contents of a forest convention, the three Rio conventions were set as legally binding agreements. Although they consider only certain aspects, functions and roles of forests, their objectives have a tremendous influence on the concept developments, understanding and implementation of SFM and have stimulated a number of political discussions and debates (e.g., the Ecosystem Approach and its interlinkages to forests, *Reducing Emissions from Deforestation and Degradation – REDD*).

1 International Tropical Timber Organization

2 Food and Agriculture Organization of the United Nations

3 United Nations Forum on Forests

4 Ministerial Conference on the Protection of Forests in Europe



Since it is outside the scope of this study to discuss what the different views have been in the international negotiations aimed at a global forest convention, it is sufficient to say that in order to advance beyond the agreements contained in the “Forest Principles” and Chapter 11 of Agenda 21, intergovernmental discussion and debate continued, first under the Intergovernmental Panel on Forests (IPF), and then under the Intergovernmental Forum on Forests (IFF). IPF and IFF agreed to more than 200 proposals for action towards SFM, but were not able to resolve many issues related to finance, transfer of technology and trade. The discussions also failed to build an agreement on an international legal instrument for forests. Countries eventually reached a compromise that resulted in the establishment of the United Nations Forum on Forests (UNFF), with the main objectives to promote the management, conservation and sustainable development of all types of forests and to strengthen long-term political commitment. Since 2000 the UNFF is the platform for the enhancement of the discussions on SFM at the global level. One of the most prominent outcomes is the *Non-Legally Binding Instrument (NLBI) on all types of forests* (UNFF, 2007), with the option to negotiate on a *Legally Binding Instrument (LBI)* in the future. Within the UNFF negotiations on a NLBI, C&I are considered as a conceptual framework to provide a common understanding of what is meant by SFM as well as a useful tool for monitoring, assessment and reporting towards its progress.

To support the work of UNFF and to promote close cooperation and coordination on forests between major multi-lateral international organizations, a Collaborative Partnership on Forests (CPF) was established in 2001. The CPF consists of 14 international organizations working together to improve forest management and conservation and the production and trade of forest products. In addition, the number of forest-relevant international and multi-lateral organizations and associated initiatives (e.g., the Tropical Forest Action Plan, the World Bank, UNDP, WRI) has significantly increased over the years. Also relevant are a series of non-governmental processes, for example, the Forest Stewardship Council (FSC), the Programme for the Endorsement of Forest Certification (PEFC), the World Commission on Forests and Sustainable Development, and the CIFOR International

Dialogue on Sustainable Forest Management – that have taken place and expanded the debate around issues like forest certification, integrated land management, and how to build institutional capacity and the role of forests in global ecological cycles. Non-governmental organizations (NGOs) have also been particularly active in international discussions and initiatives on forests. In the past years, they have contributed to important decisions on conservation and protected area issues.

The most recent developments in international forest policy include the climate talks focused on REDD+, the World Bank/FAO initiative on indicators to monitor and assess forest governance, and efforts by FAO and the International Energy Agency (IEA) to develop principles, C&I for sustainable woodfuel production, as well as recent collaboration among C&I processes and FAO to streamline and rationalize national reporting for the global forest resources assessment in 2015 (FRA 2015). While the UN Conference on Sustainable Development (Rio+20) in 2012 marked 20 years since the Forest Principles were adopted at the 1992 Rio Conference, the International Year of Forests 2011 as well as the International Day of Forests (March 21) first held in 2013, have underscored the value of forests and SFM worldwide.

2.2 Criteria and indicators for sustainable forest management

Over the last few decades, the need for justification and legitimacy of political actions in objective and quantified terms has led to the increasing use of evaluation approaches in almost all fields of human activity to determine whether policies or programmes are working effectively and to demonstrate that their resources are used in a responsible manner. For example, trends towards new public management and evidence-based policy making indicate that the world of public management has become, first and foremost, a world of measurement. In such a performance-indicator culture, it comes as no surprise that the notion of evaluation becomes increasingly important (Pregerning et al., 2012). In the fields of environment and sustainable development policy, evaluation also plays an important role. One of the main issues associated with negotiating a sustainable future is to define sustainability and then determine progress towards this goal (Hickey



and Innes 2005). This is the aim of C&I. A criterion has been defined as “a standard that a thing is judged by” while an indicator has been defined as “any variable...used to infer performance” (Prabhu et al. 2001 cited in Pregnering et al. 2012).

2.2.1 The intended role of criteria and indicators in forest policy

C&I for SFM have taken a prominent role since the Rio Earth Summit in 1992, as Chapter 11 of the Agenda 21 called for the formulation of scientifically sound criteria and guidelines for the management and sustainable development of all types of forests:

...indicators of sustainable development need to be developed to provide solid bases for decision-making at all levels and to contribute to a self-regulating sustainability of integrated environment and development systems (Chapter 11, Agenda 21, UNCED, 1992b).

Following the UNCED decisions, the international community has widely recognized and acknowledged the important role that indicator systems can play towards the achievement of long-term SFM. Various international and regional processes and initiatives (see Table 1) have led to the development C&I for SFM for use at international or regional level, national and sub-national, as well as forest management unit (FMU) levels. Different stakeholder groups (e.g., forest owners/managers, policy makers, scientists and civil society) with different views and interests are involved in the development process, reflecting the increasing global demand for sustainable economic growth, social equality, environmental conservation and good governance. In broader terms, C&I have been considered as useful tools to promote improved forest management practices as an integral part of sustainable development by:

- Providing a conceptual framework that characterizes the essential components of SFM;
- Providing a measure of the state of forests and their management, and thus assessing progress towards the achievement of SFM;
- Identifying trends and changes as well as emerging gaps and threats in the conditions of forests and their management;

- Determining the effects of forest management interventions over time;
- Facilitating decision-making in national forest policy processes;
- Providing a reference framework for the formulation and evaluation of national forest policies and programmes;
- Identify enabling conditions and mechanisms, including financial and technical resources that affect national implementation of C&I;
- Clarifying issues related to forest certification and marketing of forest products even though C&I are not performance standards.

In that context, Rametsteiner (2001) differentiates between two major areas of use of SFM indicators: (i) the collection of information; and (ii) the utilization of information for policies. The core user groups of information on SFM indicators collected in forest policy contexts are governmental organizations, such as forest policy institutions, environmental institutions or national accounting services, forest owner and forest owner interest groups, and environmental groups. These groups can use indicators for different purposes at a international and/or regional scale, national and sub-national as well as the FMU levels (Rametsteiner, 2001). Table 1 is a summary of the most prominent and various roles C&I for SFM can serve at the different levels.

2.2.2 Criteria and indicators for sustainable forest management developed within the international and regional initiatives

Already in 1991, the International Tropical Timber Organization (ITTO) developed C&I for sustainable management at the FMU level to:

assess the conditions of natural tropical forests in producer member countries and help identify weaknesses in forest practices and improvements needed (ITTO, 1992).

By 2000, based on ITTO’s pioneering work and the outcomes of the Rio Conference, eight post-UNCED international initiatives and processes worldwide had been established for the development and implementation of C&I for SFM at various levels (Table 2).



Table 1. Role of criteria and indicators for sustainable forest management at different levels.

Role of criteria and indicators	
International and/or regional scale	<ul style="list-style-type: none"> • Support international forest policy deliberations and negotiations on issues related to sustainable forest management • Provide a common understanding within and across countries of what is constituted by sustainable forest management • Provide a basis for collecting, categorizing, analyzing, reporting, and representing information the state of forests and their management • Provide an international reference for policy makers in the formulation of national policies and programmes • Serve as a basis for international cooperation and collaboration on SFM activities
National and sub-national level	<ul style="list-style-type: none"> • Describe, monitor, and report on the national forest trends and changes • Assess progress towards sustainable forest management and identify emerging threats and weaknesses • Assist in the development and evaluation of national and/or sub-national forest policies, strategies, plans and programmes • Serve as a basis for cross-sectoral forest related data collection • Focus research efforts where knowledge is still inadequate
Forest management unit level	<ul style="list-style-type: none"> • Evaluate management practices, control forest concessions and clarify issues related to certification. • A basis for developing forest certification systems (e.g. PEFC)

Source: FAO/ITTO, 1995; ISCI, 1996; IPF, 1997; FAO, 2001 and 2003.

The MCPFE C&I for SFM were developed in 1993 as “a basis for international reporting and the further development of national indicators” (Lisbon 2 Resolution, MCPFE, 1998). At the same time, C&I for West and Central Africa were developed under the auspices of the African Timber Organization (ATO) to promote implementation of SFM at regional, national and FMU levels. In addition to these initiatives, an indicator set for temperate and boreal forests was developed under the Montréal Process in 1995 to provide a common framework for member countries to describe, monitor, assess, and report on national forest trends and progress toward SFM. Similarly, in order to define the patterns by which the sustainability of the Amazonian forest can be evaluated, eight countries of the Amazon Basin have jointly developed regional C&I for sustainability, known as the Tarapoto Process. In the mid-1990s three other C&I initiatives were launched supported by the Food and Agriculture Organization (FAO) and United Nations Environment Programme (UNEP): the African Dry Zone,

the Near East Process, and the Dry Forest Asia initiative. Similarly, in 1997, C&I for regional and national level have been developed in Central America under the Lepaterique Process. While each process differs in specific content or structure, they are all conceptually similar in objective and approach. C&I of all the international, regional and national processes and initiatives centre around seven globally agreed elements of criteria for SFM⁵:

- Extent of forest resources;
- Biological diversity;
- Forest health and vitality;
- Productive functions of forest resources;
- Protective functions of forest resources;
- Socio-economic functions;
- Legal, policy and institutional framework.

⁵ The seven key thematic elements of sustainable forest management have been identified at the International Conference on the Contribution of Criteria and Indicators for SFM (CICI) in Guatemala in 2003, as well as at the Expert Consultation on Criteria and Indicators for SFM (ECCI) in the Philippines in 2004.

**Table 2.** Summary of international and regional C&I processes and initiatives.

Year	International and regional process/initiative	Region/ Forest Types	Number of Member Countries	Number of criteria	Number of indicators	C&I level
Prior to UNCED						
Early 1992	ITTO	Humid tropical forests	55	7	66	National FMU
Post-UNCED						
1993	African Timber Organization (ATO)	West and Central Africa	13	28	60	National FMU
1993	FOREST EUROPE (former MCPFE)	Europe (boreal, temperate and Mediterranean-type forests)	46 + EC	6	35	Regional National
1995	Dry Zone African Process	North, East and Southern Africa	29	7	47	Regional National
1995	Montréal Process	Temperate and boreal forests	12	7	67	National
1995	Tarapoto Proposal	Amazon Forest	12	7	47	International National FMU
1996	Near East Process	Near East	30	7	65	National
1997	Lepaterique Process	Central America	7	4 regional 8 national	40 regional 53 national	Regional National
1999	Dry Forest Asia Process	South and Central Asia	9	8	49	National

Source: FAO, 2001; Requardt, 2007; ITTO, 2012.

While agreement on common criteria facilitates international dialogue and communication on forest-related issues between the different C&I processes, there is no globally agreed set of indicators for those criteria, as indicators need to be adjusted to the ecological, economic, social and institutional conditions and needs of each region. There is also unwillingness to agree on a single global set of in-

dicators as that could be interpreted as the embryo of a global compulsory set of standards.

Parallel to the work carried out in the forestry sector, similar initiatives involving criteria and/or indicators have emerged under other international instruments or processes where forests are part of another focal theme, such as sustainable development (OECD and the UN Commission on Sustain-



able Development – CSD), biodiversity conservation (Convention on Biological Diversity – CBD), combating desertification and deforestation (UN Convention to Combat Desertification – UNCCD), etc. (FAO, 2003).

2.3 The pan-European process

2.3.1 The FOREST EUROPE – Ministerial Conferences on the Protection of Forests in Europe (MCPFE)

The Ministerial Conference on the Protection of Forests in Europe (now referred to as FOREST EUROPE) has shaped the pan-European forest dialogue for more than 20 years now. It has been recognized not only as an international platform for national policy setting, providing links between global and regional policy developments, but also as a platform for the cooperation between policy and science. Over the years, FOREST EUROPE has promoted and reinforced cross-border cooperation on forest policies throughout the European region. A number of concepts (e.g., sustainable forest management) have been introduced into the European forest policy arena. The main activities are centred around developing and updating policies and tools for maintaining the multiple functions of the forests crucial to society and for enhancing the lasting provision of goods and services. FOREST EUROPE is a well-established continuous and multi-stakeholder participatory process that currently involves 46 European countries and the European Community. In cooperation with a wide range of international institutions, scientific organizations and civil society groups, the pan-European process demonstrates its political will and commitment to implement long-term management and conservation of the European forests.

FOREST EUROPE is based on Ministerial Conferences, follow-up Expert Level Meetings (i.e., the decision-making body in the working process between the conferences), Round Table Meetings (i.e., the platform to exchange information and views on emerging issues), and Workshops and Working Groups (i.e., the platform to discuss specific subjects of scientific or technical nature). The work of FOREST EUROPE and its Liaison Unit (LU) is coordinated by the General Co-ordinating

Committee (GCC)⁶ on implementation of FOREST EUROPE decisions and on strategic developments. The Liaison Unit (LU) is the service-support office of FOREST EUROPE and is responsible for organizing and conducting all FOREST EUROPE meetings as well as for preparing reports and documents necessary for the meetings. The location of the LU is changed according to the country of chairmanship (currently, the LU is based in Madrid as Spain holds the chairmanship of FOREST EUROPE until the next Ministerial Conference).

Up to now, six Ministerial Conferences, considered as landmarks in the development of European forest policies, have been held:

- **1st MCPFE**, 1990 Strasbourg
Initiating Cross-Border Mechanisms for the Protection of Forests in Europe
- **2nd MCPFE**, 1993 Helsinki
A Commitment to Sustainable Forest Management in Europe
- **3rd MCPFE**, 1998 Lisbon
Recognising the Multiple Roles of Forests
- **4th MCPFE**, 2003 Vienna
European Forests-Common Benefits, Shared Responsibilities
- **5th MCPFE**, 2007 Warsaw
Forests for Quality of Life
- **6th MCPFE**, 2011 Oslo
European 2020 Targets for Forests and Launching Negotiations for a Legally-Binding Agreement

Important documents of the Ministerial Conferences are the adopted declarations and resolutions, reflecting the FOREST EUROPE regional approach towards the protection and sustainable management of forests on the pan-European level. As already mentioned, the concept of SFM was defined at pan-European level and outlined in **Helsinki 1 Resolution**, providing a general forest policy direction and a long-term goal. The Helsinki conference also set the beginning of the development of the pan-European C&I for SFM and the pan-European Operational Level Guidelines (PEOLG) to promote SFM and facilitate the evaluation of progress towards it. Although the

⁶ The GCC is at present (2013) constituted by five countries: Norway, Spain, Slovak Republic, Turkey, and Germany.



definition has not been changed since its adoption, the general regional approach of FOREST EUROPE is continuously developed, and constantly adapting to new policy challenges and areas of concerns for the effective planning, manage and delivery of forest goods and services. Even though non-legally binding, the adopted declarations and resolutions are implemented at the national and regional levels, enhancing a common understanding, development and implementation of actions towards SFM. Key elements of the work between the Ministerial Conferences are the FOREST EUROPE Work Programmes implemented jointly with existing international scientific and technical institutions and organizations working in the field of forestry. This important pan-European cooperation constitutes a guiding principle of the MCPFE and includes the Food and Agriculture Organization of the UN (FAO), the UN Economic Commission for Europe (UNECE), the European Commission (EC), the UN Environment Programme (UNEP), the Union of Foresters of Southern Europe (USSE), research institutions such as the International Union of Forest Research Organizations (IUFRO), the European Forest Institute (EFI), the Regional Environmental Centre (REC), and the International Plant Genetic Resources Institute (IPGRI), NGOs and other relevant international and national forest authorities and institutions.

2.3.2 The pan-European criteria and indicators for sustainable forest management

a. Development

The development of the pan-European C&I for SFM is the result of a multi-stakeholder participatory process, led by governments, formed by different forest stakeholders and experts representing different backgrounds, views, interests and information requirements. In the follow-up process to the 1993 Helsinki Conference, the pan-European C&I were developed as a common policy instrument to monitor, evaluate and report progress towards SFM. In that context, criteria were defined as standards that:

...characterise the essential elements or set of conditions or processes by which sustainable forest management may be assessed (MCPFE, 2002b).

Indicators were defined as variables that:

...show changes over time for each criterion and demonstrate the progress made towards its specified objective (MCPFE, 2002b).

To fulfil their purpose, indicators shall be (MCPFE, 2001a and 2001b):

- uniform across Europe;
- applicable on national level;
- coherent with the Ministerial Conference Resolutions, especially H1 and H2;
- comprehensive and simple;
- reportable;
- adjustable.

In 1994, at the MCPFE Expert Level Meeting in Geneva, a core set of six criteria formulated as policy goals, 27 quantitative and 101 descriptive indicators was developed, adopted and presented at the conference of the United Nations Commission on Sustainable Development (CSD) in 1995. Jointly with the ITTO C&I for SFM, the first MCPFE C&I catalogue formed an important basis and supported other regional processes (e.g., Montréal Process) to develop C&I for SFM (Requardt, 2007).

At the 1998 Ministerial Conference in Lisbon, the MCPFE reported on the status of SFM in Europe by using the pan-European C&I, based on preliminary results of the UN-ECE/FAO Temperate and Boreal Forest Resources Assessment in 2000 and on additional data. Noting that C&I can play a prominent role towards the realization and implementation of a long-term SFM, the Signatory States and the European Community gave them a high political status by adopting Resolution L2 “Pan-European Criteria, Indicators and Operational Level Guidelines for Sustainable Forest Management”. Since the development of the first pan-European indicator set, knowledge, data collection procedures and information needs have progressively developed and as a result, the existing pan-European indicator set was improved and approved by the MCPFE Expert Level Meeting in Vienna 2002. It was officially endorsed by the MCPFE Vienna Conference in 2003 (Table 3), signifying the consensus achieved by the European countries on the most important aspects of SFM. An Advisory Group (AG), representing relevant organizations in Europe, was formed to as-



sist the MCPFE during the improvement process by ensuring comprehensive utilization of the existing knowledge on indicators and data collection aspects in Europe. The Advisory Group consulted with a wide range of experts through a series of four workshops, which ensured that the diversity of national situations and experiences as well as the work undertaken by various bodies in Europe were adequately reflected (MCPFE, 2002a). It is also important to note that the relevant terms and definitions used for the pan-European C&I are in compliance with the TBFRA/FRA terminology. Furthermore, in order to give a comprehensive picture of protected and protective forests and other wooded land in Europe, while keeping links to international classification systems used for all kinds of protected area, an MCPFE Classification of *Protected and Protective Forests and Other Wooded Land* in Europe was established making more distinctions than the classifications of the *International Union for Conservation of Nature* (IUCN) and the Common Database on Designated Areas (CDDA) of the European Environment Agency (EEA) (MCPFE, 2001c).

b. Structure

In line with the seven key thematic elements of SFM, the improved pan-European set (see Table 3) consists of six criteria:

- 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, conservation and appropriate enhancement of protective functions in forest management (notably soil and water); and
- 6) Maintenance of other socio-economic functions and conditions.

The fulfilment of the six criteria can be evaluated through 35 quantitative indicators which show changes over time for each criterion and demonstrate the progress made towards its objectives

(MCPFE, 2000a). On the other hand, 17 qualitative indicators enable monitoring of the overall policies, institutions and instruments regarding national SFM, enhance accountability and transparency of policy making and allow better understanding of the interplay between the state of forests and policy-making. Up to now, the pan-European set has served as the basis for State of Europe's Forests assessments in 2003, 2007 and 2011 and provided information on the status and changes of major aspects underlying SFM. This information is meant to facilitate the evaluation of the achievements towards each criterion's goals (FOREST EUROPE, 2011a). Irrespective of the improvement of the pan-European C&I, the FOREST EUROPE signatories have committed themselves to continue to promote development and implementation of C&I at a national level by further improving the "*basis for forest monitoring and harmonized reporting systems*" in order to fulfil the needs of information for national and international reporting on SFM. They recognized also the need for continuity of terms and definitions and decided to proceed to implement, continuously review and further improve the associated indicators (MCPFE, 2002a,b; FOREST EUROPE, 2011a).

c. Purpose

In accordance with the achieved harmonization basis, the potential role of the pan-European C&I in supporting scientific, political and operational work undertaken with regard to SFM has been widely recognized. At the 1998 Lisbon Conference, the political commitments made by the European forest ministers and the European Union in relation to the development and implementation of the pan-European indicators were outlined. Although clear objectives were not specified, FOREST EUROPE signatory states and the European Community officially have agreed to use the pan-European C&I as "*a basis for international reporting and the further development of national indicators*" (Lisbon 2 Resolution, MCPFE, 1998) and a tool for monitoring, evaluating and reporting progress towards SFM. In general terms, by the use of pan-European set as a common system for measuring and reporting national data, two major objectives can be achieved: (i) to provide a pan-European overview representing the state and trends of European forests, and (ii) to allow demonstration to the

**Table 3.** Improved pan-European criteria and indicators for sustainable forest management (MCPFE, 2002a).

<p>C1 Maintenance and Appropriate Enhancement of Forest Resources and their Contribution to Global Carbon Cycles</p> <p>1.1 Forest area and OWL 1.2 Growing stock 1.3 Age structure and/or diameter distribution 1.4 Carbon stock</p>	<p>C4 Maintenance, Conservation and Appropriate Enhancement of Biological Diversity in Forest Ecosystems</p> <p>4.1 Tree species composition 4.2 Regeneration 4.3 Naturalness 4.4 Introduced tree species 4.5 Deadwood 4.6 Genetic resources 4.7 Landscape pattern 4.8 Threatened forest species 4.9 Protected forests</p>
<p>C2 Maintenance of Forest Ecosystem Health and Vitality</p> <p>2.1 Deposition of air pollutants 2.2 Soil condition 2.3 Defoliation 2.4 Forest damage</p>	<p>C5 Maintenance and Appropriate Enhancement of Protective Functions in Forest Management</p> <p>5.1 Protective forests – soil, water and other ecosystem functions 5.2 Protective forests – infrastructure and managed natural resources</p>
<p>C3 Maintenance and Encouragement of Productive Functions of Forests</p> <p>3.1 Increment and fellings 3.2 Roundwood 3.3 Non-wood goods 3.4 Services 3.5 Forests under management plans</p>	<p>C6 Maintenance of Other Socio-Economic Functions and Conditions</p> <p>6.1 Forest holdings 6.2 Contribution of forest sector to GDP 6.3 Net revenue 6.4 Expenditures for services 6.5 Forest sector workforce 6.6 Occupational safety and health 6.7 Wood consumption 6.8 Trade in wood 6.9 Energy from wood resources 6.10 Accessibility for recreation 6.11 Cultural and spiritual values</p>
<p>A. Overall policies, institutions and instruments for sustainable forest management</p> <p>A.1 National forest programmes or similar A.2 Institutional frameworks A.3 Legal/regulatory frameworks and international commitments A.4 Financial instruments/economic policy A.5 Informational means</p>	<p>B. Policies, institutions and instruments by policy area</p> <p>B1 Land use and forest area and OWL B2 Carbon balance B3 Health and vitality B4 Production and use of wood B5 Production and use of non-wood goods and services, provision of especially recreation B6 Biodiversity B7 Protective forests B8 Economic viability B9 Employment (incl. safety and health) B10 Public awareness and participation B11 Research, training and education B12 Cultural and spiritual values</p>

OWL= Other wooded land



public of whether progress is being made towards achieving certain commitments (Prins, 2002). Based on the implementation of MCPFE commitments (1998–2011), particularly in relation to the Lisbon 2 Resolution, the pan-European C&I are considered as (MCPFE, 2003a, 2007a, FOREST EUROPE, 2011c):

- Framework for international reporting on the trends and changes in the state and conditions of forests and forest management in Europe;
- Framework for the management, monitoring and reporting on SFM and related policies;
- An instrument to evaluate existing sets of national or sub-national C&I, and also newly established guidelines;
- Framework for promoting better management and forest policy enhancement;
- Basis for data collection and the drawing up of country reports on forest resources and their management;
- Functional tool contributing to international agreements towards SFM and forest certification;
- Basis for developing of national standard and certification of management systems.

In addition, the pan-European set has been viewed as a potentially useful instrument to formulate, monitor and evaluate National Forest Programmes (NFPs), designed to implement and realize a common strategy and policy of a long-term SFM within Europe.

2.3.3 Cooperation and collaboration among C&I for SFM processes and initiatives

Concerning the role of the pan-European C&I for international reporting to FOREST EUROPE, it was soon realized that co-operation with relevant organizations (i.e., UNECE, FAO) and the work undertaken under the agenda of FRA and TBFRA is needed in order to avoid duplication of efforts and overlap among the processes and to facilitate comparisons between countries. As a result, over the last two decades there has been collaborative work towards harmonization as well as improved communication and coordination among the processes. Harmonization relates to the “existing con-

cepts which should be brought together in a way to be more easy to compare, which could be seen as a bottom up approach starting from an existing divergence and ending in a state of comparability” (Köhl et al., 2000). Since the first expert meeting on the harmonization of C&I for SFM, held in Rome in 1995, there have been a number of international seminars, conferences and workshops on how to clarify terminology and facilitate comparison between countries. Although there was general agreement on the need to ensure comparability between the different processes, it was also recognized that they should pursue their goals unimpeded, and in a way that would be compatible with their particular environmental and socio-economic contexts (FAO, 1997). In the following years, further possibilities for improvements in harmonizing ongoing initiatives related to C&I (e.g., ITTO, Montréal process, FOREST EUROPE, FAO FRA) have been discussed at the Inter-Criteria and Indicator Process Collaboration Workshop (held in Poland 2006), the Forest Criteria and Indicators Analytical Framework and Report Workshop (held in Finland, 2008), the International Seminar on Challenges of SFM -Integrating Environmental, Social and Economic Values of Forests (held in Japan, 2011). Subsequently, the Joint Workshop of the Montréal Process, Observatory of Central African Forests (OFAC), ITTO, FOREST EUROPE and FAO in Canada, in October 2011 has led to a process to develop a Collaborative Forest Resources Questionnaire (CFRQ) in order to reduce the proliferation of monitoring requirements and associated reporting burdens imposed by the different processes and initiatives. In addition, in 2012, the Technical Consultation on “Preparation for Global Forest Resources. Assessments 2015” held in Ispra, (Italy) and the “Streamlining Forest Based Reporting” Workshop in Florida (USA) have further highlighted the benefits of collaborative work among the processes and continued relevance of C&I for SFM. However, in spite of these joint efforts to streamline and rationalize national reporting for Tropic, FRAs and regional forest assessments, the need to continue to strengthen efforts to reach global consensus on key concepts and terms used in the international discussion on C&I has been underscored.



Figure 1. Major developments in FOREST EUROPE with respect to sustainable forest management and criteria and indicators since UNCED in 1992.

