1. Introduction and scope of the report

1.1 Criteria and indicators emerging in the context of sustainable forest management

Since the beginning of the 1990s, an enhanced view on sustainable forest management (SFM) has entered the stage of forest policy, and the concept of criteria and indicators (C&I) has developed as one means of implementing sustainable forest management (SFM) worldwide (Wijewardana, 2008). In the wake of the United Nations Conference on Environment and Development (UNCED) of Rio 1992, several different international processes and initiatives have developed criteria and indicators as a policy instrument to evaluate and report progress towards SFM. In addition, indicators are used in certification initiatives to support monitoring and reporting for marketing purposes (Rametsteiner and Simula, 2003) and a variety of science-based monitoring and evaluation purposes from national down to the forest management unit level (Franc et al., 2001; Raison et al., 2001), often directly referring to political SFM processes (e.g., PEFC to the pan-European process).

In Europe, the initiative to promote and officially commit to SFM is driven by the Ministerial Conference on the Protection of Forests in Europe (MCPFE). In the 1990s, a set of national-level indicators was established to initialize and standardize pan-European reporting. This set was adopted at the third MCPFE in Lisbon (MCPFE, 1998); at the fourth MCPFE in Vienna (MCPFE, 2003a) an improved set of six criteria and 35 quantitative indicators (describing the forest status and changes) and 17 qualitative indicators (describing the national forest policies, institutions and instruments used to move towards SFM) was adopted. By now, the pan-European set has served as the basis for the State of Europe's Forests assessments in 2003, 2007 and 2011 for the reference years 1990, 2000, 2005, 2010.

Reaching an advanced state after their introduction, there is a clear notion today that there is little policy implementation research on-going on the use and impact of pan-European C&I. Policy makers and administrative bodies alike are inter-ested in knowing whether their proposed systems work, and whether their efforts in data collection and processing is useful and making a difference. End-users of C&I information are interested in using C&I data as a sound basis for their judgments.

What seems simple, tends to become complex due to the nature of SFM and the flexibility, but the high methodological demands of C&I. In principle, we can state that C&I are multi-functional in their nature. They can be used for a variety of purposes. For instance (after Linser, 2001):
- as a reporting tool in terms of description and diagnosis of a situation;
- as a communication instrument to improve clarity on complex items;
- as forecasting tools for picturing future trends;
- as tools for the collection and processing of information and interests;
- as means of political control both as controlling and decision-making instruments; and
- as instruments for checks of effectiveness of programs and measures.

From these tasks, heterogeneous demands on the development and use of indicators for SFM monitoring and assessment can be formulated (after Mendoza et al., 1999):
(i.) Indicators are to give a reliable picture of the forest situation and the complexity arising from a multi-dimensional view of forest systems.
(ii.) Indicators should gather quantitative and qualitative information from different sources and on different scales.
(iii.) The assessment of sustainable forest management calls for the participation of multiple interest groups, stakeholders and experts, and a high degree of transparency.
(iv.) There is need of case-specific clarification on which parameters and methods are used to assess sustainability. For reaching high acceptance in a SFM process, achieving consensus among the interest groups is crucial.
(v.) Analysis of indicator applications should be interactive to secure learning effects and informed decision-making.

Furthermore, crucial requirements in the design of sustainability indicators include: (i) relevance for the policy and planning processes and specific to the observed system; (ii) sensitivity to changes both in the observed system as well as in policy and management practices (Vacik and Wolfslehner, 2004); (iii) validity in terms of revealing underlying assumptions, surrogates and proxies; and (iv) links to the decision environment in forest policy and planning (Failing and Gregory, 2003).

Examining how these theoretical claims differ from the practical implementation of C&I, and how big these gaps are in quantity and quality is put to test in this study. We also want to break down the general observation in C&I research to the specific empirics and needs in the implementation of the pan-European C&I set in order to further develop a consistent, transparent, and moreover highly accepted instrument for monitoring, evaluating, and assessing SFM in Europe.

These considerations provide the framework for the following analysis of the implementation of the pan-European C&I in general, in theory, and – most relevant – in practice in the 46 signatory states of the FOREST EUROPE process.

1.2 Problem definition

As mentioned before, information on the implementation of the Pan-European C&I set is scarce and vague. This project is the first effort to collect information on the state of C&I implementation in Europe.

The particular problems we have identified refer to:
• What does it mean to implement C&I (definition, concepts)?
• How has the pan-European C&I set been implemented in practice?
• What problems and gaps have been encountered?
• What should be done to improve the situation, with respect to:
  – Practice in countries, international organizations;
  – Theory and concepts of C&I;
  – Structure and content of the pan-European set.

To address these problems, the scope of the report is defined along the following lines:

1) Definition of "Implementation of C&I"

The term "implementing criteria and indicators" is often used, but has not yet been formally defined, at least in the pan-European context. "Implementing" may be understood as putting into practice agreed objectives or methods. However, despite an extensive academic literature on C&I, there is no formal official text defining the objectives of the pan-European set. The nearest approximation is the Lisbon resolution L2, from 1998[1].

However, in the interests of clarity and structure, it is desirable to have a definition for use in the project, so the following working definition has been drawn up, after discussion inside the project team and with the advisory group, and will be used during the project.

2) *Status-quo and advancement in C&I application and research*

Much has been researched on C&I in the past 20 years in general. Hence, a condensation of these findings is needed to build a sound reference to the pan-European C&I set. This relates to issues such as C&I structure, indicator development and selection, C&I design vs. actual use, transparency and communication, transience among different levels of application and among different C&I and information systems.

3) *Examination of implementation practice*

Finally, an empirical analysis is needed in order to understand the strength and weaknesses of the current C&I set in the actual 'implementation'. The pan-European set of C&I may be implemented at several levels: pan-European, national and sub-national. Consequently, experiences and expert knowledge has to be gathered on all different levels of implementation that goes beyond information in scientific literature, and findings synthesized for the further development of the C&I set. These aspects refer inter alia to (i) applicability, (ii) consistency, (iii) validity, (iv) acceptance, (v) efficiency, and (vi) flexibility of the implementation of the pan-European C&I set.

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1   The revised indicators were only endorsed by an Expert Level Meeting, not formally approved by ministers in Vienna, and contain no formal definition of objectives.

1.3 Aims and structure of the report

Following the outline of the emerging role of C&I for SFM monitoring and assessment, the increasing demands towards a C&I set, and the problem definition arising from the need for better understanding the implementation of C&I, the State-of-the-Art report has the following main objectives:

1) To provide a definition and structured framework for the analysis of the implementation of C&I for SFM;
2) To provide a historical overview of the different developments of the pan-European C&I for SFM at European, national and other sectors level;
3) To review indicators with respect to conceptual validity, data availability, linkages to other indicators, and actual and potential challenges in implementation;
4) To conduct a sound analysis of the current practice of C&I implementation based on the working definition, and synthesizing the state-of-the art of scientific literature with expert knowledge of policy makers, C&I experts, and practical advisors;
5) To study the modes of C&I implementation on international, European and national levels and link the findings to outcomes and impacts of C&I implementation as well as to the implementation environment in terms of procedure, infrastructure, and capacities;
6) To identify demands and potentials for the further development of the pan-European C&I set by drawing conclusions from lessons learned of the past process and current practice.

The report is structured as follows:

Chapter 2 sets the context of how C&I have been developed and used worldwide and in Europe. It relates the role of C&I to the emerging concept of SFM and the international dialogue on forests. It introduces the pan-European SFM process FOREST EUROPE, and outlines the genesis of the pan-European C&I set, its development, purpose, structure, and procedural progress.

Chapter 3 provides a state-of-the-art review of the scientific discourse on C&I methodology and application. It looks at C&I development, structure and design, fields of applications, indicator systems and logical frameworks, data quality and availability, consistency and validity of C&I systems, and distils major findings to be pursued further in the context of the pan-European C&I set.

Chapter 4 provides the methodology applied to the empirical part of the study, in particular as regards: (i) the working definition of implementing C&I; (ii) quantitative analysis of C&I as reported in the State of Europe's forests reports; (iii) interview design of experts; (iv) nationals assessments and (v) regional perspectives of C&I implementation with dedicated workshops.

Chapter 5 presents the major empirical findings on the implementation of C&I. It summarizes the state of implementation of MCPFE commitments related to C&I and gives insight into pan-European and national approaches on C&I implementation (monitoring, reporting, data collection, communication, policy formulation and other fields of application). It provides analysis on strength and weakness of C&I implementation, and identifies potentials for further improvement of the C&I set in terms of usability, effectiveness, consistency, and compatibility of the current C&I set with other information instruments.

Chapter 6 builds a synthesis of the cumulative findings and lessons learnt obtained during the various analyses. It provides a clear perspective on the current status of C&I implementation and the main trends associated with the various fields of applications.

Chapter 7 draws conclusions delivering an outlook for future development of C&I (i) at the pan-European level and to international organizations, (ii) for policy makers at the national and sub-national levels, inside and outside the forest sector, (iii) the research community, (iv) for a broad range of affected stakeholders. It proposes recommendations to overcome the challenges identified during the investigation of this study.

The report shall serve as a state-of-the-art document on the implementation of the pan-European C&I set, and may serve as a reference and input for the further development of C&I in the Forest Europe process, and in the negotiations on a legally-binding instrument on SFM in Europe.