MINISTERIAL CONFERENCE ON THE PROTECTION OF FORESTS IN EUROPE

REPORT

INTER-CRITERIA AND INDICATORS (C&I) PROCESS COLLABORATION WORKSHOP

A collaborative effort
by the International Tropical
Timber Organization (ITTO),
the Ministerial Conference
on the Protection of Forests
in Europe (MCPFE),
the Montreal Process,
the Food and Agriculture
Organization of the UN (FAO),
the UN Economic Commission
for Europe (UNECE) and
the U.S. Forest Service

8–10 June, 2006
Bialowieza, Poland

WARSZAWA, 2007

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Liaison Unit Warsaw
ul. Bitwy Warszawskiej 1920 r. nr 3
00-973 Warsaw, Poland
tel. +48 22 331 70 31 tel./fax. + 48 22 331 70 32
e-mail: liaison. unit@lu-warsaw.pl
www.mcpfe.org

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Małgorzata Buszko-Briggs, Robert L. Hendricks, Claire Howell.

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Executive Summary

The **Inter-Criteria and Indicators (C&I) Process Collaboration Workshop** was a collaborative effort by the International Tropical Timber Organization (ITTO), the Ministerial Conference on the Protection of Forests in Europe (MCPFE), the Montreal Process, the Food and Agriculture Organization of the UN (FAO), the UN Economic Commission for Europe (UNECE) and the U.S. Forest Service. A special note of thanks goes to the MCPFE for hosting the workshop.

The workshop was held in response to repeated calls, mainly by international expert conferences on criteria and indicators (C&I) for sustainable forest management (SFM), for more and improved collaboration among criteria and indicator processes.

To stimulate discussion, the following three papers were presented:

- Opportunities to create synergy among the C&I processes specific to the topic of harmonization – Ewald Rametsteiner;
- The use and audie nces of national and international forest sustainability reports – Jari Parviainen and Markus Lier;
- Logic models for how criteria and indicators relate to each other, and as a set, to sustainable forest management and sustainable development – Richard Guldin and Theodore Heintz.

Workshop observations and recommendations

1. Workshop participants expressed support for the FAO Forest Resource Assessment's (FRA) use of C&I for global forest data, summaries, assessments and reporting on forests. However, a desire for more collaboration among FAO, C&I processes and countries on the FRA was expressed.
2. Collaboration is welcome and useful when mutually driven, informally initiated and the benefits are clear.
3. Harmonization, while commonly understood to be a desired goal of C&I, is often misunderstood.
4. Criteria and indicators and their resulting reports will carry more weight if there were:

- clearer relevance to country development agendas or programs;
- links to other economic sector development goals;
- well-supported and visible theory behind indicators;
- more innovative presentations of information in national reports telling meaningful stories; and
- more synergy among the active C&I processes.

5. Future C&I process collaborative workshops might focus on:

- how to market national forest reports (i.e., developing a better understanding how special interest groups, users at lower levels of management, other sectors and decision makers etc. are audiences for which national sustainability reports must be specifically tailored);
- methods of analyzing indicator data (the development of systems models);

- clarification of common global, regional, country and forest management unit level data threads (is there a "core" set common to them all?);
- protocols for efficient data collection; and
- messages to share with colleagues, stakeholders and leadership.

It is hoped the C&I processes and participating countries will review the full report and consider hosting one of the future recommended collaboration workshops.

Recommendations and Conclusions

The **Inter-Criteria and Indicators (C&I) Process Collaboration Workshop** was a collaborative effort by the International Tropical Timber Organization (ITTO), the Ministerial Conference on the Protection of Forests in Europe (MCPFE), the Montreal Process, the Food and Agriculture Organization of the UN (FAO), the UN Economic Commission for Europe (UNECE) and the U.S. Forest Service. A special note of thanks goes to the MCPFE for hosting the workshop.

The workshop was held in response to repeated calls, mainly by international expert conferences on criteria and indicators (C&I) for sustainable forest management (SFM), for more and improved collaboration among criteria and indicators processes (see Appendix 3). The agenda of the workshop is provided in Appendix 1. Kit Prins (UNECE) chaired all plenary sessions of the workshop.

Since the workshop was organized to help ultimately improve national reporting on trends in sustainable forest management, Rob Hendricks, one of the workshop organizers, challenged participants to figure out how to:

- present information so policy makers want to know more;
- encourage non-governmental organizations and others anticipating the next edition of a country's national report on forests to remain engaged; and
- encourage the science, policy and research sectors to place a high priority on indicator work for sustainable forest management.

This workshop was only the third C&I collaboration workshop ever held, and was the first that many of the participants had an opportunity to attend. Participants identified the following immediate benefits resulting from the workshop:

- improvement of information sharing across processes;
- reaffirmation that C&I is the best available mechanism for reporting on progress towards SFM;
- recognition that there are technical challenges regarding C&I that can be effectively addressed by focused sub-groups (small collaborative workshops); and
- opportunities for new users of C&I to meet others working in the area in order to share ideas, issues and solutions.

The workshop provided two full days of discussions with a field trip to foster networks and relationships. Participants at the workshop were primarily from the more active C&I processes (ITTO, Montreal Process, MCPFE). However, representatives of international organizations (UNECE, UNFF and FAO) and other C&I processes (Africa, Central Asia, Central America) also participated. The list of participants is provided in Appendix 2.

ITTO, the Montreal Process, MCPFE, UNECE and FAO provided overviews to ensure that all participants were aware of current initiatives, implementation issues and collaboration needs of C&I processes and international organizations. This was followed by the presentation of three papers designed to stimulate discussion:

- Opportunities to create synergy among the C&I processes specific to the topic of harmonization – Ewald Rametsteiner;
- The use and audiences of national and international forest sustainability reports – Jari Parviainen;

- Logic models for how criteria and indicators relate to each other, and as a set, to sustainable forest management and sustainable development – Richard Guldin and Ted Heintz.

These papers are provided in the second part of this Report.

Each presentation was followed by group discussions, after which three working groups deliberated and presented their observations and recommendations in plenary. Observations and recommendations are presented below. It is hoped that C&I processes and international organizations might consider these observations and recommendations as the basis for further focused collaboration among C&I processes.

Observations and recommendations

The working groups made the following set of observations and recommendations for consideration by C&I processes and international organizations.

Overall, participants expressed support for the FAO Forest Resource Assessment's (FRA) use of C&I as the vehicle for global forest data, summaries, assessments and reporting on forests. Participants shared a desire for more collaboration on FRA between FAO, C&I processes and countries, believing that over time, such collaboration would produce more comparable, complementary and complete SFM assessments at all levels of forest reporting. Preparation for the FRA 2010 is an opportunity to accomplish this, and participants suggested the formation of a feedback mechanism, including establishment of an advisory group and a web forum to address FRA parameters, definitions and classifications.

Cooperation & collaboration

1. The value of C&I for understanding, reporting on and promoting SFM has yet to be maximized. Collaboration is one way to efficiently respond to this need.

2. Collaboration is welcome and useful when:

- mutually driven, informally initiated and the benefits are clear; and
- the C&I processes or individual countries initiate it.

3. C&I process-driven workshops have a natural advantage for sharing experience in:

- actual applications of indicator based assessments, e.g. national planning/national forest programs (NFPs), etc;
- forest management unit level applications of C&I, capacity building programs, etc;
- the different audiences for which national reports should be useful;
- methods of analyzing indicator data; and
- protocols for efficient data collection.

4. Harmonization, while commonly understood to be a desired goal of C&I processes, is often misunderstood. This is especially true regarding terms and definitions; however, internationally agreed terms and definitions are a common goal whenever possible.

Inter-process collaboration among C&I processes will accelerate progress in the use of C&I and national reports

The C&I processes are encouraged to:

1. Host joint or parallel meetings, e.g. the recent MPWG + FAO meeting in Japan;

2. Arrange twinning arrangements with related C&I processes (e.g. the Helsinki and Nairobi conventions dealing with the marine and coastal environment), for example:

- between regional and other programs, especially between stronger/more developed and weaker/ less developed C&I processes; and
- long term arrangements, e.g. the ITTO/ ATO (African Timber Organization) arrangement.

3. Produce highly regarded products from country or process-led initiatives addressing specific issues of high interest to countries (e.g. the New Zealand planted forests workshop).

There is a need to strengthen political support for sustainable forest management, national reports and the use of C&I

The C&I processes and countries must:

1. Make it more clear how criteria and indicators are useful to those working with:

- country, other sector, and forest development agendas or programs;
- the Millennium Development Goals; and
- the UNFF's four Global Objectives on forests.

2. Build support among a wider group of audiences for national sustainability reports by using innovative ways of presenting information.

3. Make it easier for decision makers and stakeholders to interpret the criteria and indicators. This requires writing non-technical "stories" of how the observed trends in forests affect people, their lives and their communities.

4. Develop a well supported and visible theory, conceptual models that demonstrate the scientific foundation supporting indicators (through the use of models, rationale statements, etc.).

5. Demonstrate practical national and sub-national applications for C&I, e.g. more efficient reporting at the sub-national, national and international levels.

6. Show how C&I are being used at the sub-national level, thus increasing the body of support for the use of indicators.

7. Change the way the forest sector addresses sustainable development issues by:

- proactively engaging other sector colleagues and, concurrently, reducing the endless dialogue within the sector;
- making visible forest sector leadership in sustainability concepts by sharing:
  - 100 years of evolved sustainable development concepts;
  - conceptual models and technology useful to other sectors also struggling with sustainability issues.

  - databases and coordinated global, national and sub-national data, assessments and reports.
- maintaining strong relationships with other forest related processes, e.g.:
  - the Convention on Biological Diversity;
  - the UN Framework Convention on Climate Change (UNFCCC); and
  - the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

To address the above observations, further workshops should be held to:

1. Improve C&I rationales regarding SFM and their relationships to each other.
2. Clarify common data threads through global, regional, country and forest management unit level reporting. Is there a "core" set common to them all?
3. Market national forest reports more effectively by:

- understanding how special interest groups, users at lower levels of management, decision makers, etc. are each audiences for country reports. National reports must be designed to attract their interest and use; and
- understanding how to tailor compelling messages, or forest condition stories, to each audience or sector group.

4. Identify audiences, including other sectors, decision makers, etc. for C&I data and national SFM reports.
5. Achieve effective website design for national sustainability reports and C&I processes.
6. Understand indicator relationships to be able to generate "stories" that people can understand.
7. Document specific examples of how C&I have been used in:

- policy decisions (including budgeting);
- science decisions;
- NGO actions; and
- public information on forests.

8. Use C&I as a data and management framework to facilitate data sharing among data providers and experts.
9. Take advantage of FAO's offer of assistance to update, run and link C&I-process websites.
10. Articulate a compelling vision for the future of forests in the 21st century that could be part of national reports.
11. Generate awareness in countries not currently involved in C&I processes about progress in C&I reporting.
12. Integrate C&I information into national policy making and national forest assessments and inventories.

Messages to share with colleagues, stakeholders and leadership

1. Sustainable forest management contributes to sustainable development.
2. Cross-sectoral coordination is absolutely essential for sustainable forest management to be become a reality.
3. C&I have improved monitoring, reporting, strategic planning and the public dialogue, and have contributed to reduced tension among traditional adversary groups.
4. C&I processes must strengthen their capacity, maintain (or regain) momentum and maintain flexibility.
5. An understanding of audiences and the presentation of compelling data and stories will ensure C&I reports (and forests) are relevant.
6. Better reporting will clarify the relevance of forests to many audiences and increase forest's political standing.

It is hoped that the C&I processes and participating countries will consider this report and take the initiative to implement the above workshop recommendations.

WORKSHOP PAPERS

Opportunities to Create Synergy Among the C&I Processes Specific to the Topic of Harmonization

Ewald Rametsteiner[1]

1. Background and objectives

Around and after UNCED in 1992 regional processes to develop criteria and indicators (C&I) for sustainable forest management (SFM) played an immensely important role in further developing an improved understanding of the meaning of the term sustainable forest management and the multitude of aspects involved at all levels. All of the nine C&I processes currently existing have laid the foundation for a considerably renewed and expanded understanding on what is involved in the sustainable management of all types of forests.

In the relatively short period of around a decade C&I as a tool for SFM have gained the endorsement of the highest level political body dealing with SFM as well as of the more progressive members of the corporate business community. In 2004 the UNFF acknowledged seven common thematic elements of SFM, drawn from the criteria identified by existing C&I processes, to offer a reference framework for SFM. The business community is increasingly using C&I and/or related concepts for both certification and corporate social responsibility reporting, both in developed and developing countries.

Given the fact that three of the nine C&I processes use C&I to report on SFM, and given that existing mechanisms and institutions are in place that run across these three C&I processes, it seems useful to further explore possibilities of increased collaboration on the harmonization of concepts, terms, classifications and definitions between these processes.

Coordination among countries and international forest organizations has occurred for decades. Coordination has focused on traditional functions such as forest inventory, silviculture, fire, community involvement etc. In the last decade, however, social, watershed, economic and institutional issues have required a new kind of forest report. The criteria and indicators for sustainable forest management reflect this. Common understanding on how to collect and report on some indicators shared by processes, however, is lacking. An example is how to define and measure forest fragmentation.

The objective of the paper is to produce a consensus on the meaning of collaboration among the C&I processes, and to recommend the next steps. The purpose is to stimulate a discussion as to the meaning and goals of possible future collaboration/harmonization among the experienced C&I processes regarding terms and definitions, collecting storing and sharing data, monitoring assessment and reporting and a communication network, taking account of other relevant regional and global processes, notably FRA and UNFCCC reporting.

2. Why have international bodies brought attention to the topic of collaboration and harmonization?

Over the years, governments have called for stronger collaboration among the criteria and indicator processes (IPF 1997, UNFF 2001, UNFF 2004). Countries and or experts have held a series

1 Ewald Rametsteiner, policy analyst, BOKU University and IIASA Feistmantelstr. 4, A-1180 Vienna, Austria, tel: +43 1 476 54 4413
e-mail: ewald.rametsteiner@boku.ac.at

of meetings to strengthen collaboration on C&I for SFM. The most important of these were CICI (2003) and ECCI (2004). Similarly, a number of meetings were held on monitoring, assessment and reporting (MAR) on SFM using C&I (Yokohama 2001, UNFF AHEG 2003) as well as on the harmonization of forest-related terms and definitions, led by FAO (2002, 2002, 2004). Moreover, the Collaborative Partnership on Forests (CPF) established a Task Force on Streamlining Forest-related Reporting in 2002.

International bodies have brought attention to the topic of collaboration and harmonization on C&I for a variety of reasons, including the concrete experience of the benefits of developing more regionally specific C&I sets while in parallel co-ordinating these processes internationally, and the opportunities created by using C&Is for monitoring, assessment and reporting. A number of very positive lessons have been learned that support calls for further collaboration and harmonization amongst C&I processes, including that:

- largely thanks to the international co ordination efforts at an early stage of development of C&I for SFM, today the regionally adapted forest C&I sets are largely cohesive on global level while reflecting important regional differences. This has enabled and facilitated the global acceptance of the concept of C&I for SFM and strongly helped promotion of SFM;
- many countries, international organizations and international processes, are either directly or indirectly using or considering use of criteria and indicators to monitor and assess forest conditions and trends and progress towards sustainable forest management;
- C&I have contributed to a better understanding of sustainable forest management, improved forest policies, programmes, practices and information, stakeholder involvement and partnerships and enhanced collaboration among countries.

However, despite the considerable progress, further and improved collaboration and harmonization amongst C&I processes is urged by international bodies to respond to requests by countries, including to reduce the reporting burden of countries and to increase the effectiveness of international policies affecting forests, which crucially depend on the availability as well as quality and consistency of information on the many aspects comprising SFM.

3. Are there differences between C&I processes that influence collaboration and harmonization?

The different C&I processes have very different origins, contexts and purposes. It is thus not surprising that approaches to forest-related C&Is diverge within and between countries, regional processes, and bodies. The abundance of different approaches to the development and use of C&I is an important strength as well as an impediment, especially for the international dialogue on forests and for international assessment and reporting.

The main C&I processes differ in major ways, many of which have a direct consequence on collaboration and harmonization issues. Amongst others, they differ in:

- type and number of members,
- organizational structures and bodies,
- decision making processes,
- scope of objectives,
- funding arrangements,
- role and use of C&I in the overall process.

ITTO work on C&I is guided by formal governmental decisions in the context of the legally binding International Tropical Timber Agreement (ITTA). The International Tropical Timber Organization (ITTO) is an intergovernmental organization promoting the conservation and sustainable management, use and trade of tropical forest resources amongst its 59 members. Its current formal objectives comprise 14 different aspects (ITTA 1994). The ITTO secretariat, working in a fixed intergovernmental infrastructure of institutional bodies and formalized processes, is accountable to governments, with decisions taken at meetings twice a year at International Tropical Timber Council (ITTC) meetings. For instance, the ITTO C&I for SFM was reviewed and approved by the in December 2004. Work on C&I is based on explicitly given mandates, including finances. ITTO countries have a "legally binding" obligation to follow up on their own commitment to report progress towards ITTO-agreed goals towards SFM, using ITTO's C&I for SFM.

MCPFE work on C&I is undertaken in the context of a non-legally binding international governmental process amongst 44[2] countries in Europe and the European Commission whose overall aim is the protection and sustainable management of forests. The member states of the MCPFE collaborate on the basis of a given organizational, procedural and financial structure. A limited number of (four) countries (General Co-ordinating Committee, GCC) provide funding for the process, including for running a secretariat, in a rotation system. Major commitments are taken through periodic (appr. every 5 year) Ministerial Conferences, with the majority of decisions on their implementation are taken by annual meetings of signatory states and the European Commission (Expert Level Meetings, unanimous decisions, open stakeholder involvement encouraged). C&Is have formally been adopted and endorsed at some stage by governments through a Declaration, along with Resolutions on other aspects of SFM.

The Montreal Process is a Canadian government-launched process of 12 countries specifically to promote C&I for SFM, and Canada hosts a small secretariat to facilitate co-ordination since its inception. It is a government-driven process whose explicit objective is to develop C&I for SFM amongst the member states and to promote their national and sub-national implementation. This is reflected in its institutional setup, where the decision making body, called a "Working Group" and comprised of member country representatives, endorse C&Is, after having been elaborated with the help of a "Technical Advisory Committee". While the process has been very successful in generating commitment and support by participating countries, it is running on a less formalized and institutionalized basis than the ITTO or the MCPFE. It can thus less rely on and is less restricted by formal institutions. Unlike some other processes the main emphasis of the Montreal Process in using the C&I in reporting is less on joint international reporting (as presumably e.g. MCPFE and ITTO) but in national reporting by countries.

The "Tarapoto Process" on C&I of the Amazon Cooperation Treaty shares some similarities with the above described ITTO or MCPFE processes in being based on intergovernmental agreements, intergovernmental infrastructure with a secretariat responsible for a larger portfolio of commitments to implement. The ATO is an intergovernmental organization for cooperation on forestry issues relating to its 14 member countries, with the objective of promoting the production and trade of African timber within the framework of SFM. ITTO and ATO have collaborated to make the ATO set of C&I consistent with the ITTO set. One major driver for interest in C&I in African countries has been their potential role in promoting forest certification.

Other C&I processes, including the Lepaterique process in Central America, the Near East process, the Dry-zone Africa and the Dry Asia C&I initiative are not built around an identifiable

2 Status for 2006.

permanent local secretariat with a longer-term mandate to work further on C&I for SFM. Much of the high quality work on technical specification for developing and applying C&I in several of these processes has been facilitated and assisted by FAO. Without increased support through national and international assistance and political commitment it is difficult to see how these important initiatives could be involved in further harmonization on C&I. Enhanced collaboration with other C&I processes will be important.

Apart from the different preconditions for further collaboration on C&I and related harmonization, the initiatives are at very different stages of development and implementation of C&I. Several have already gone through or are currently going through a phase of testing the indicators initially chosen. Increasingly many have already applied C&I through collecting data on indicators, and several processes, most prominently the MCPFE and ITTO have used their C&I sets for international reporting (of the Montreal Process, having its main emphasis on national reports, several countries have produced national reports on the C&I). Even fewer have evaluated and improved their initial set of indicators on the basis of experience gained (ITTO and MCPFE).

4. What types of harmonization/collaboration are needed and possible?

4.1. Types and areas of collaboration

Improved collaboration, as understood here, denotes joint work on the improvement of specific aspects of C&I processes and especially the further development of criteria and indicators for SFM and their use in monitoring, assessment and reporting (MAR) on SFM. It mainly relates to co-operation between the different C&I processes as well as between C&I processes and other important bodies related to MAR on SFM and the users of information thereby provided, such as countries, international bodies, companies, other stakeholders or the society at large. One major area of collaboration is the harmonization of different aspects related to C&Is.

Possible levels of collaboration comprise C&I development as well as C&I implementation and use, are outlined in Figure 1. Each of the three areas, C&I development, implementation and use, requires consistent improvement along with expansion of knowledge and information availability. Collaboration, exchange of experience and products developed (terms & definitions documents, classifications used, etc.) and benchmarking amongst C&I processes is feasible and useful in practically all these areas.

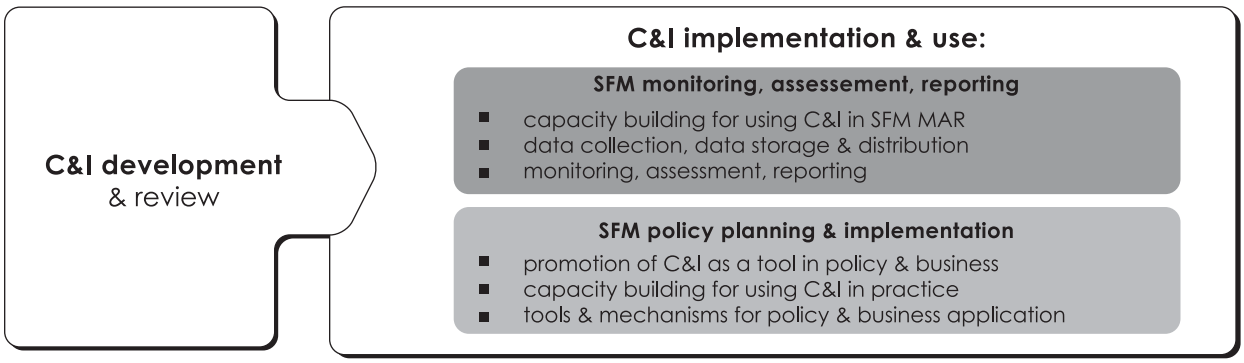

Figure 1. Areas for co-ordination and collaboration/harmonization on C&I for SFM.

Most of the leading C&I processes have established collaborative bodies and structures within the C&I process for the conceptual development, evaluation and review of C&Is

within the process. Some have collaborated closely with data collecting and storing bodies in the implemenation and use of C&I for reporting, e.g. the MCPFE with UNECE/FAO. Over the years C&I processes have made experiences and accrued strengths in different areas. For instance, ITTO is the only process which has set up national level capacity building workshops on C&I implementation and use. The MCPFE has learned to efficiently collaborate with established international data collection bodies (UNECE/FAO) to collect and store data for monitoring, assessment and reporting, the Montreal Process has been more vocal in promoting C&I in different international fora than other processes. Not all forest C&I processes have yet reached the implementation and use phases, and not all processes have used C&I for common reporting. None of the reporting processes, it seems, has streamlined the timing of international reporting with other major reporting efforts (Montreal Process reports on the occasion of the World Forestry Congresses, MCPFE on the Ministerial Conferences, etc.).

What seems needed is collaboration by interested C&I processes and with other initiatives and bodies in key areas of further development, implementation and use of C&I. With respect to further development and evaluation of C&Is this includes:

a) Further improvement of collaboration of different key bodies and persons within countries, particularly on biodiversity and socio-economic and cultural aspects. This includes improved collaboration between different focal points for different forest-related reporting using C&I, including C&I process focal points, national correspondents for FRA, focal points for CBD and UNFCCC reporting, etc.

b) Further collaboration by countries within C&I processes to further harmonize terms, definitions and parameter classifications between countries and organizations. In any country and region a multitude of organizations collects and stores data in slightly different formats, often without being aware of data needs and formats.This is particularly so for non-traditional forest data collection aspecets, including socio-economic and biodiversity issues.

c) Further collaboration of C&I processes with global and regional institutions, such as FAO or regional UN Economic Commissions and other bodies on terms, definitions and classifications. By adopting the structure and approach of C&I for the 2005 FAO Forest Resources Assessment, most likely also for the 2010 assessment, a huge potential for cost-saving collaboration has emerged.

d) Assistance to further development and review of C&I by C&I processes currently interested but not actively working on making C&I sets. In relation to collaboration between C&I processes that already report and other C&I processes that do not yet report, the ITTO/ATO joint initiative is a positive example of a "buddy system", where processes with a similar context on the ground team up for the sake of enhanced common progress.

With respect to further implementation and use of C&Is this includes:

a) Further collaboration on the streamlining of forest-related reporting, including with the Collaborative Partnership on Forest Task Force.

b) Establishing collaboration on capacity building and training on the use of C&I in MAR, using synergies such as between the ITTO national level capacity building workshops and FAO National Correspondents to FRA 2010 as well as possible related regional workshops in the run up to 2010.

c) Further collaboration of C&I processes with global and regional institutions, such as FAO or regional UN Economic Commissions and other bodies on data collection and data

storing. It is resource intensive to establish yet another structure that compiles data from national sources at international level, thereby duplicating work done elsewhere. Much of this international data compilation from national sources, data storage and dissemination is and should be administered by international institutions with long term experience in forest related data handling, such as FAO, UNECE, ITTO, amongst others.

d) Further expansion of the successful collaboration of FAO/UNECE/EUROSTAT/ITTO on the Joint Forest Sector Questionnaire (expanding joint periodic data collection on further aspects of joint interest in socio-economic indicators or learning from the approach and apply it in the context of joint data collection for both the FRA 2010 or similar international data collection and data collection in the context of regional C&I processes, e.g. for the next report to be prepared by countries of the Montreal Process).

e) A future area of collaboration lies in the area of joint further development of approaches and standards for data interpretation, especially of remote sensing and field data collection, but also on forest-related socio-economic as well as policy and institutional issues.

4.2. Types and areas of harmonization

Harmonization is understood here to mean making existing concepts of C&I and related approaches to monitoring, assessment and reporting which use the same or closely related concepts and approaches, comparable and consistent. This includes indicators, definitions of terms, parameter classifications, data collection protocols, metadata standards, data base management, assessment procedures as well as reporting formats and procedures.

It is important to note the difference between harmonization and standardization. The former works by compiling and comparing existing approaches and concepts into a framework with no intent to interfere but with the aim to facilitate processes by pointing out the meaning of the various definitions, clarifying differences and relations and easing informed choices. Standardization requires the adoption of a uniform definition or prescription within different contexts, or applying the same rules.

Harmonization on C&I related aspects has so far covered mainly the harmonization of concepts and approaches. This was mainly achieved through the work of the C&I processes over the years as well through a range of international and global conferences and workshops, starting around 1992. An example of inter-C&I process indicator "fit" is shown in Figure 2.

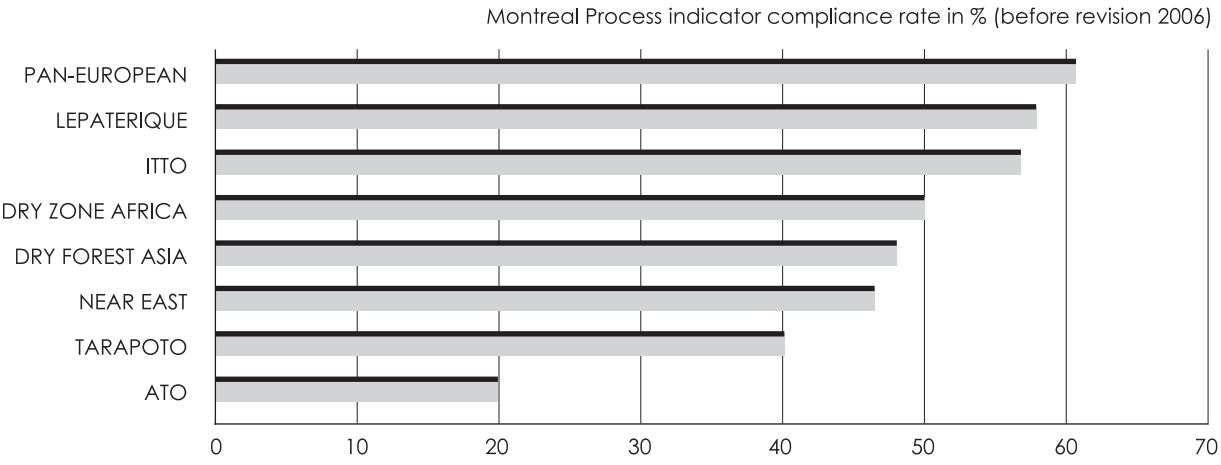

Figure 2. Montreal Process indicator "compliance rate" (compatibility) with indicators from other processes (source: computed from Ochoa Cagliostro, 2005).

The harmonization of terms and definitions across different conventions, processes and initiatives was recently pushed by a number of related specific events co-organized by FAO in 2002 and 2003, as well as the adoption of the C&I-based approach to the FAO Forest Resources Assessment 2005, and the related "global flagship" terms & definitions document. In comparing existing definitions in use in their respective areas of work, the FAO expert meetings on harmonization concluded that differences were minor in the definitions of a range of "classical" forest terms as well as other commonly used terms with differing meaning from region to region, e.g. "semi-natural" or "old-growth".

A further area for further work concerns the harmonization of data collection formats and the development of data collection protocols as well as protocols for the adjustment of national data to a common agreed set of definitions and to a common reference year. In this context, FAO FRA 2005 has set a new benchmark for some time to come. Harmonization of data collection protocols and procedures across different bodies was successfully achieved within the FAO/UNECE/EUROSTAT/ITTO collaboration on the Joint Forest Sector Questionnaire.

Harmonizing and providing a better structured access to different reports in the context of international reporting on forest-related issues has been achieved partly by the CPF Task Force on Streamlining Forest-related Reporting. It seeks practical solutions to manage forest-related information and to make forest-related information and reports easily accessible by seeking ways to improve information storage and retrieval systems, which make data and information more easily accessible and by seeking possibilities for integrated or interlinked information management system(s) among CPF members. It has developed an internet portal that provides easy access to national reports submitted to major international processes dealing with forests and the corresponding reporting formats, with a view to facilitating reporting on forests to international agreements and fora, improving knowledge of work undertaken on forests, and to improving coordination.

Further work on harmonizing concepts, terms, definitions and classifications used at the international level is and will be undertaken by many bodies and processes. It is therefore essential to identify areas where C&I processes can make a useful contribution, and possibly have a common understanding of a range of principles for further work. Some initial principles could be:

- C&I processes should assist global level efforts in harmonizing terms and definitions wherever invited to do so and should avoid duplication of work or the creation of contradicting or competing classifications or definitions on global level.
- C&I processes should take global level agreements fully into account in regional level work on the harmonization of terms and definitions.
- C&I processes should adopt existing international definitions wherever possible; whenever necessary, these should be adapted, improved and related to each other.
- C&I processes should help identify needed definitions, as new information needs and indicators are generating new terms.
- C&I processes that have not yet begun reporting should attempt insofar as possible to use definitions already agreed by processes that are reporting.

4.3. What aspects of the C&I processes are best candidates for improved collaboration or harmonization?

As shown above, the scope of improving collaboration and harmonization on C&I related aspects is huge. Many oportunities exist to exploiting the synergies to be gained. In the following only a few concrete aspects are taken up.

a) C&I development: reducing information/data gaps and data classification inconsistencies.

The monitoring and assessment in particular of indicators on socio-economic aspects, such as employment, on the volumes and value of ono-wood goods and services, on protective functions and biological diversity protection have been found to be difficult. Some of the more difficult indicators, especially those on biological diversity and socio economic functions, are fundamental to understanding the management of a nation's forests.

Those C&I processes that have undertaken efforts to common regional reporting have usually had to overcome a longer list of issues related to the common use of concepts, terms, definitions and classifications. The table below (Table 1) shows those areas that were identified by different C&I processes and data collection bodies to be difficult areas to collect consistent and reliable data.

Table 1. Areas of C&I related harmonization.

biological diversity	- protection classification for different protection status - consistent and comparable forest type classifications - landscape level patterns / forest fragmentation classes and common measurement approach - naturalness classes (primary – plantation, etc.)
non-wood forest products	- appropriate classes and valuation approaches
forest related services	- appropriate classes for marketed and non-marketed services (recreational, environmental, protective), including valuation approaches - carbon sequestration measurement
soil and water conservation	- appropriate and consistent soil classes, data - water related aspects, incl. water quality classes and data
social and cultural aspects and values	- appropriate and consistent approaches incl. classes, data
forest employment	- terms, classification systems and definitions for employment categories
forest ownership	- consistent and detailed forest ownership categories and data
policy and institutional frame conditions	- appropriate approaches and indicator categories, data

Policy and institutional frame conditions, while being a criterion in most or all processes, has so far not received sufficiently close attention. Similarly, some specific issues (e.g. illegal trade and illegal logging) are not explicitly addressed in the indicators of some C&I processes. Particularly in the area of defining terms, data specifications and classifications, close collaboration of C&I process experts of countries with FAO is a must in order to avoid duplication, overlap and further inconsistencies. Close contact between focal points of C&I processes and FAO National Correspondents should be strongly promoted, especially on national level.

b) C&I implementation and use: reducing the reporting burden of countries through harmonization and collaboration, including for better use of ICT.

The elaboration of C&I sets alone is not enough to create benefits. Efforts should be directed towards data collection, storage and distribution as well as streamlining international reporting. Simplified co ordination and streamlining of data collection and reporting on SFM can be much enhanced by global approaches to C&I.

National forest-related reporting to international fora is placing a heavy burden on countries. Such burden could be effectively be reduced if decentralized data retrieval systems and/or data storage systems by international data providers would be able to be based on harmonized forest-related terms and data collection and metadata protocols. Co operation and collaboration on uses, including reporting, in the long term could be organized via national websites where information is structured along similar C&I frameworks. Different interested bodies and institutions could then collect this information, thereby circumventing the need to request information. C&I provide a framework to bring together the uncoordinated data being collected in most countries. The framework would also provide protocols for the data local people chose to collect for their own proposes.

The CPF Task Force on Streamlining of Forest-related Reporting, comprising of seven international forest-related bodies, including the secretariats of CBD, UNCCD and the UNFCCC works on reducing and streamlining reporting requests, synchronizing reporting cycles, harmonizing data collection methods and increasing data comparability and compatibility, and facilitating the accessibility and flows of existing information. It also seeks to guide ongoing international processes by sharing experiences and lessons learned on different reporting frameworks and by seeking possibilities for common approaches for data and information collection, storage and reporting by international organizations.

Data compilation for upcoming reporting requests, such as for CBD 2008, SEBI 2010, FRA 2010, the UNFF "Year of Forests 2010" etc. could thus be much streamlined by making best use of data stored by international data providers, while data verification for the different information requests could and often should still be carried out by the various National Correspondents or Focal Points that otherwise would have had to invest considerable time in fulfilling detailed reporting obligations.

A number of initiatives are in place to work on the further improvement of shared data systems, including FORIS, the FAO knowledge management system on forests and the largest repository of forest-related information in the UN system. Another such initiative is the "Global Forest Information Service" (GFIS), led by IUFRO as a CPF joint initiative. GFIS is being developed to provide an internet gateway to forest information resources from around the world. On a broader scale GEOSS, the Global Earth Observation System of Systems, is an initiative that aims at broad integration of terrestrial and space data, including on forests. Further regional database initiatives are the European Forest Information and Communication Platform (EFICP) established within the EU and related projects as well as efforts to further develop the compatibility of forest information systems in North America.

c) Further promotion of C&I.

It seems important to assist those regional processes that lag behind in developing and implementing regional sets, either through bilateral co-operative arrangements between countries and/or processes or, preferably, through a more co ordinated multilateral type of arrangement under the umbrella of UNFF. In relation to collaboration between C&I processes that already report and other C&I processes that do not yet report, the ITTO/ATO joint initiative is a positive example of a "buddy system", where processes with a similar context on the ground team up for the sake of enhanced common progress.

Concerning promoting the use of indicators in different contexts of forest policy and management good examples of their practical application should be made more widely visible, e.g. through workshops, seminars or a compendium of the best possible C&I practices used

in policy and management. Possible aspects to cover in the use of national level C&I beyond reporting are the relation of C&I to national forest programmes or similar national or sub national policy planning tools. Another area is guidance to forest management planning, implementation and evaluation, including operational level guidelines, model forests or forest certification and its various potential uses for verification, e.g. for carbon sequestration, or corporate social responsibility reporting.

5. Who will be hurt if this does not happen? Who would benefit?

A whole host of factors have contributed to the reluctance of countries to work towards more ambitious collaboration on C&I in the past. First, regional initiatives were able to develop a by then new concept more quickly and with better regard to regionally specific situations and conditions. Second, the early phase was characterised by a need to identify the different perspectives on SFM of different stakeholders and the most essential commonly shared elements of SFM. Processes were also concerned that a harmonisation of C&I would reduce them to the lowest common denominator and render them unresponsive to national stakeholder concerns.

A strong focus on and basis in local and national level "on the ground" is and will be essential for the longer term usefulness of the C&I processes. This requires close attention to stakeholders within countries and increased work with the many different bodies related to C&I within countries and processes. This focus should not change. Anybody interested in the healthy further development of C&I should therefore make sure that the emphasis of work on C&I development is on national and sub-national stakeholder participation and broad involvement as well as on further national level implementation.

It is nevertheless equally important to recognize that further international collaboration and harmonization will be essential for the healthy development of C&I in the long term as a widely accepted and understood tool in SFM. Once it is felt that a reasonably broad common understanding of the major dimension of the C&I concept has been reached amongst a hopefully large number of participating stakeholders within a country and C&I processes, all involved are losing out by not cashing in on the benefits to be had. Every increase in the wider use of C&Is and related concepts, terms and definitions once broadly accepted has a very real and visible positive network externality, across countries and over time.

If harmonization and collaboration on international level does not happen it sharply reduces the overall benefit of the work to all involved. Users and countries are the ones that benefit most from internationally harmonized concepts, indicators, terms and definitions, streamlined data collection, assessment and reporting. A multitude of changing concepts, terms and non-harmonised definitions come at a very high cost to countries and users. Most importantly one of the prime goals and necessities of monitoring SFM is lost: to detect and assess changes in key characteristics of forests over time, including measuring progress towards sustainable forest management.

Consider, for example, FAO had had a realistic chance to use consistent indicators and definitions of terms. If global harmonization of key terms and definitions would have been feasible in 1947, the value of data collected then would have considerably increased with each subsequent assessment ever since. Countries would have time lines showing changes and trends on key aspects related to forests and progress towards sustainable forest management since then. The situation in fact is different. Very few or no timeline can reliably be constructed on any forest related aspect on the basis of global FRA data. However, as terms and definitions used in the global assessments undertaken by FAO over decades changed from assessment to assessment, one of the most important benefits

of repeated assessment were lost: to detect and assess changes in key characteristics of forests over time, including to measure progress towards sustainable forest management. Thus, the data collected in previous (expensive) data collection exercises is becoming largely useless over time (see Figure 3).

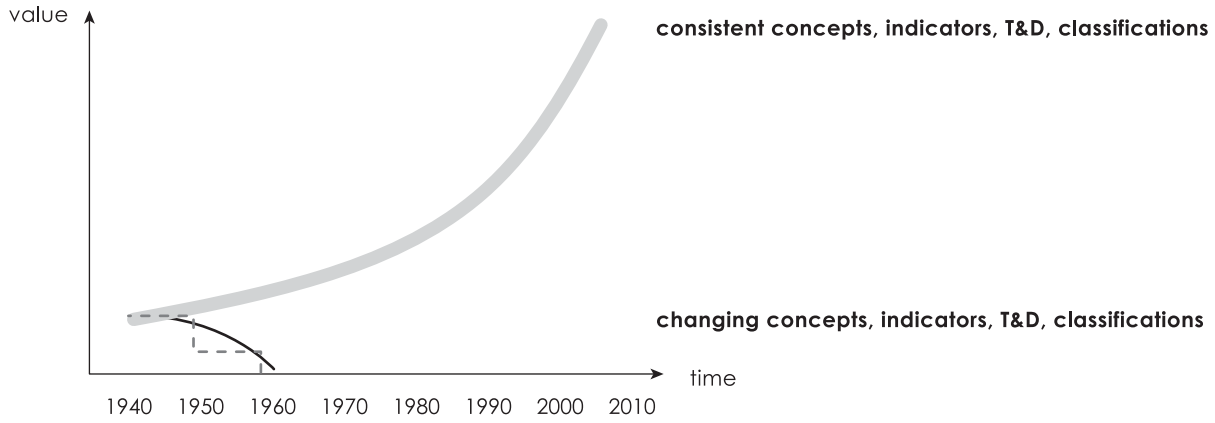

Figure 3. Change in value of forest-related data over time and with subsequent assessments (T&D = terms and definitions).

Not only do different approaches and interpretations of the same indicator or term effectively hinder communication and make it more difficult to reach common understanding among the multitude of partners involved. They also lead to:

- increased costs of assessments,
- duplicating of efforts, and overlaps in reporting,
- inconsistencies between different reporting on the same topics, but to different institutions and related difficulties of interpretation,
- misinterpretation of data,
- increased coordination burdens,
- undue delays in reporting and in international negotiations,
- ambiguities in interpretation,
- non-compatible data that cannot be aggregated.

Consistent and harmonized concepts, terms and definitions and classifications as well as monitoring, assessment and reporting arrangements would enhance value for money spent in data collection on national levels through:

- benefits accruing over time through the ability to use previously collected data for time series, change detection and trend identification on national and international levels,
- increased and multiple use of data collected on national level,
- increased value of data that is compatible with and part of a larger multinational framework,
- increased influence on local data collection institutions and funding institutions if international framework exists,

- reduced costs and efforts of data collection, compilation or adjustment for different incompatible information needs and data requests and related formats,
- higher ability to profit from research and methodical developments and data collection that is relevant to use by countries,
- higher ability to benefit from data collected elsewhere, including for comparisons of the national situation in a wider international context,
- increased possibilities to collaborate and share data, e.g. on ecosystems, across administrative boundaries.

It is therefore important to assure that countries and processes are aware of the long-term benefits of the use of C&I for SFM as the primary framework for reporting on progress in SFM, and the need and seriousness of harmonizing C&I terms and definitions at the international level. This will help capture the future expectations of countries able to report on SFM. Reduced uncertainty about future developments in turn considerably reduces the risk of making wrong national decisions and enhances the willingness of countries to adopt internationally harmonized terms and definitions.

Inconsistencies in data due to the use of slightly different terms, definitions and classifications are a consequence of the complexity of situations and interest. Nonetheless, harmonization would bring benefit to uses by reducing errors in employing terms, the reporting burden on countries, and the confusion in communicating with the media and the public at large. Reducing duplication and overlap through better collaboration and harmonization will help minimise costs, including through benefiting from each other's experience and knowledge.

6. A better C&I communication network

6.1. Is a communication network needed? What would it look like?

While co ordination and collaboration between some forest related C&I processes has been good, it has been less so between others partly due to the different stages of development of the perceived lack of opportunities, costs involved or the lack of mutual advantages of close collaboration and/or the need to focus on getting a C&I set that is realistically related to the situation "on the ground". Information sharing between C&I processes has taken place as necessary with major events in 1993 (CSCE, Montreal), 1996 (ISCI, Helsinki), 2001 (MAR, Yokohama), 2003 (CICI, Guatemala City), 2004 (ECCI, Cebu City) and now in Bialowieza, Poland, in 2006.

Given that meetings between C&I processes "happen" on an ad-hoc basis over the span of more than a decade, it seems obvious that there is a very loose network of communication in place, and that there is a large potential need to establish better and more stable forms of communication between processes as well as between processes and other bodies involved in C&I, such as major data collection bodies (e.g. FAO) and users (e.g. CPF).

A range of networks, bodies and mechanisms are in place to involve country experts in the better collaboration of experts on C&I processes and monitoring, assessment and reporting using C&Is. Five mechanisms that operate on the global level are currently most visible and could be used as possible platforms for further increased collaboration between C&I experts as well as between these and FAO in the context of the 2010 Forest Resources Assessment. Similarly, a number of existing forest-related mechanisms and networks are established on regional level that can be better utilized for increased collaboration before considering establishing new bo-

dies. Furthermore, it is essential to enhance communication between political level (C&I processes, national representatives in international fora) and technical level (national forest inventory, national correspondents to FRA) experts at national and international levels (Table 2).

Table 2. Existing mechanisms and platforms that could be used for increased collaboration of and with C&I processes.

Global	Kotka meetings related to FRA (approx. every five years)
	Network of National Correspondents for FRA
	Advisory Group on FRA
	Periodic meetings of C&I for SFM experts (e.g. CICI 2003, ECCI 2004)
	CPF Task Force on Forest Related Reporting
Regional	UNECE/FAO Team of Specialists on Monitoring SFM in the UNECE
	Inter-Secretariat Working Group on Forestry Statistics of FAO/ECE/EUROSTAT/ITTO
	C&I process meetings of individual processes (MCPFE ELM, MP WG, ITTO Council, etc.)
National	Focal points to the different international C&I and data related bodies and processes above
	Focal points to different international bodies and secretariats, including CPF, UNFF, CBD, UNFCCC and other international conventions

At a certain stage, and if well co-ordinated with the existing institutions including main data collection bodies such as FAO FRA and the networks listed in Table 2, establishing a much improved and more predictable and reliable basis for collaboration amongst C&I processes, and particularly with international data collection and use institutions. A number of possible networks is listed in Table 3 below.

Table 3. Potentially new communication networks for strengthening collaboration of and with C&I processes.

Global	a C&I process secretariat, hosted by e.g. FAO, tasked to promote C&I development and use and to serve the meetings of the C&I processes
	a periodic (e.g. 5-year) schedule of meetings amongst C&I processes, replacing the ad-hoc meetings of the past decade
	a Technical Advisory Group, working on a mandate given by the C&I processes at periodic meetings
	short term Technical Task Forces on specific and narrowly defined harmonization tasks (e.g. classifications for a specific indicator) making proposals to the C&I processes
	a specific and well maintained and updated website for C&I processes, hosted e.g. by FAO as well as better accessible websites by individual C&I processes

6.2. What might be the potential benefits?

After almost a decade of experience related to C&I there is ample evidence to show the merits of enhanced co-ordination and collaboration between different initiatives. To begin with, few initiatives would exist today without international collaboration. It has also helped to avoid duplication of work and facilitated learning from each other's experience, thus saving costs and time. At a regional level co operation has allowed regions to proceed much quicker in the development of their first sets of C&I.

The globally harmonised approach to C&I for characterizing SFM have been of undisputed benefit to all those truly interested in promoting a more sustainable conservation and use of forest. C&I as a concept has greatly increased the understanding of the many aspects involved in managing forests. C&I as a reference framework for structured communication has reduced co-ordination and communication costs at all, from local to global, levels since. For example, it is widely acknowledged that UNFF would not have been able to agree on a set of seven common thematic elements of SFM without the profound work of the various regional C&I processes.

A global approach adds value to C&I and regional, national or sub national level efforts through enhancing their:

- political relevance,
- broad visibility,
- ability to provide information more cost-effectively,
- ability to increase the technical feasibility of data collection, and
- ability to increase the reliability and validity of data.

Many of these aspects can better be achieved through higher levels of organized collaboration amongst C&I processes and with other bodies. Jointly, C&I processes can make contributions to the harmonization of terms and definitions by raising awareness of the importance of the issue, including putting the topic on the agenda and presenting specific suggestions at regular expert meetings and wider C&I related conferences. National level data collection, reporting and communication can all be streamlined through internationally agreed C&I processes. Besides, multilaterally adopted C&I processes carry greater international recognition than processes individually developed by countries. However, it is important that flexibility be maintained to allow for adjustment to new situations since forest management is a dynamic process.

7. Concluding comments

Ten years after the initial introduction of C&I it is time to enhance collaboration to push the application of this most innovative forest management tool to achieve global SFM. Given the potential benefits that can be gained from further collaboration amongst C&I processes including on further harmonization in support of existing data collection efforts, there is a clear need to make these benefits visible to countries and major users. The elaboration of C&I sets and their further improvement alone is not enough to create the full breath of benefits from C&Is. Efforts should be directed towards data collection, storage and distribution as well as streamlining international reporting. It is important to communicate that a collaborative approach will help the further promotion of C&I as a useful tool in promoting SFM.

The main addressees for recommendations formulated in this meeting should be countries, both in their capacity to support and implement terms and definitions related work in their countries and their role in promoting and supporting the establishment of collaboration and communication networks and infrastructure.

In the end what needs to be noted is that in spite of the great importance of C&I in promoting SFM, that more than 150 countries are involved in them and that the advantages and possibilities of further development are clearly visible, crucial factors such as high level political commitment, human and technical capacities as well as financial resources are often still lacking.

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The Use and Audiences of National and International Forest Sustainability Reports

Jari Parviainen[1]& Markus Lier[2]

1. Introduction

Statistics in the form of, for example, yearbooks, and leaflets and brochures detailing facts and figures regarding forests have traditionally been the most common methods for reporting and disseminating information on forest resources in various countries. The introduction of criteria and indicators (C&I) for monitoring sustainable forest management (SFM) more than ten years ago comprehensively broadened the view on aspects of SFM, and the possibilities of reporting on the state of forests. The country reports based on C&I provide a balanced compendium of information on the status and trends of sustainable forest management.

The internationally agreed criteria and indicators framework is the key for harmonized reporting and making comparisons between countries. The national forest reports can provide simultaneous and useful information for forest policy, forest management as well as for forest research and education purposes regarding all elements of sustainability. There are however significant variations in the reporting depending on the quality of the information available and capacity to gather this information.

Reporting for national purposes as well as for international conventions, instruments and bodies is increasing. This has resulted in overlapping efforts among stakeholders and authorities. In addition, the production of such comprehensive reports is expensive.

In addition to the reporting on the forest sector's needs, forest indicators have also been used by other sectors in their reporting such as in biodiversity, environmental or economic reports.

In order to refine how these national forest reports are presented and to assure they are useful for forest policy formulation, it is useful to explore **(1) how and for what purposes the reports are being used, (2) the report's audience, (3) which aspects are emphasized in reporting and (4) in what ways they are the most effectively used in communication.**

The experiences each country has in reporting should be of collective benefit in the refinement of C&I, development of guidance for reporting on the state of forests, and improve coordination, compiling and communication for international purposes.

The use of country reports reflects at the same time the use of criteria and indicator sets for various purposes, for example monitoring the implementation of national forest programs. Therefore in this analysis some aspects related to the indicators are discussed.

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1 Jari Parviainen, Director, Finnish Forest Research Institute (Metla), Joensuu, Yliopistokatu 6, FIN–80100 Joensuu, tel. +358 10 2113010, e–mail: jari.parviainen@metla.fi.

2 Markus Lier, Planning officer for international relations, Finnish Forest Research Institute (Metla), Yliopistokatu 6, FIN–80100 Joensuu, tel. +358 10 2113063, e–mail: markus.lier@metla.fi.

2. Material and analysis

The material consists of country case studies, analyses of forest report summaries of the three regional C&I processes and interviews and discussions with national C&I experts. The main aim was to find diverse approaches for the reporting and compiling of the reports, as well as their uses. The newest reports were used when available. The following 9 country case studies were analysed (see details in the Appendix to this paper):

MCPFE[3]	Montreal process[4]	ITTO[5]
Austria 2004	Australia 2003	Ghana 2005
Switzerland 2005	Japan 2003	Malaysia 2003
Finland 2000	USA 2003	The Philippines 2005

In addition, as complementary material, other country reports were studied especially in order to find concrete elements over the uses of the reports. For the analysis of the linkages between country forest reports and other sector's reports some concrete examples were analysed from Finland, Italy, Belgium and Australia. By comparing the country forest reports with the leaflets, facts and figures and forest statistics several samples over those material was collected from various countries.

The following international and regional forest sustainability reports were analysed:

- Summary review: Europe's Forests in the Spotlight. Based on the State of Europe's Forests 2003. The MCPFE Report on Sustainable Forest Management in Europe. Jointly prepared by the MCPFE Liaison Unit Vienna and UNECE[6]/FAO;
- Montreal Process. First Forest Overview Report 2003;
- Status of Tropical Forest Management 2005. Summary Report. ITTO. A special edition of the Tropical Forest Update 2006/1.

3. Characteristics of national and international sustainability forest reports (MCPFE, Montreal Process and ITTO)

3.1. Characteristics of the national forest reports

In all country reports the regional frame of C&I has been followed, though adjusted to each country's situation. Country modifications have led to variation in the numbers and interpretation of indicators. In some countries additional indicators have been introduced such as in Switzerland where forest certification has been used as an indicator. The complete set of indicators could not be fully applied in any of the countries. Due to the lack of information, especially for quantitative indicators, the ITTO countries could only report some of the ITTO indicators.

3 **Ministerial Conference on Protection of Forests in Europe. 44 member countries**: Albania, 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, Monaco, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Slovak Republic, San Marino, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom (status for 2006).

4 **12 member countries**: Argentina, Australia, Canada, Chile, China, Japan, Republic of Korea, Mexico, New Zealand, Russian Federation, Uruguay and USA.

5 **International Tropical Timber Organization. 59 member countries** producers, consumers and the European Union: e.g. Australia, Austria, Belgium/Luxembourg, Bolivia, Brazil, Cambodia, Cameroon, Canada, Central African Republic, China, Colombia, Cote-d'Ivoire, Democratic Republic of Congo, Denmark, Ecuador, Egypt, European Union, Fiji, Finland, France, Gabon, Germany, Ghana, Greece, Guyana, Honduras, India, Indonesia, Ireland, Italy, Japan, Liberia, Malaysia, Myanmar, Nepal, The Netherlands, New Zealand, Norway, Panama, Papua New Guinea, Peru, Philippines, Republic of Congo, Republic of Korea, Spain, Suriname, Sweden, Switzerland, Thailand, Togo, United Kingdom, Unites States of America, Venezuela etc.

6 United Nations Economic Commission for Europe.

The following table presents information over the compilation, audiences and uses of the country reports as expressed in the reports preface, introduction, or goal settings.

	MCPFE			Montreal			ITTO		
	Austria	Switzer-land	Finland	USA	Australia	Japan	Malaysia	Philip-pines	Ghana
Compilation									
Stakeholder panel	x	x	x	x	x	x	x	–	–
Ministries	x	x	x	x	x	x	x	x	x
Scientists	x	x	x	x	x	x	x	x	x
Main audience									
Experts, profession-als	x	x	x	x	x	x	x	x	x
Public information	x	x	x	x	x	–	–	–	–
Main goal men-tioned in report									
Tool for forest policy and strate-gies, and forest management	x	x	x	x	x	x	x	x	x
Providing data for international sustainability reports	(x)	(x)	(x)	x	x	x	x	x	x
Forest certification	–	x[7]	x	–	–	x	x	–	–

The majority of the country reports of the MCPFE and Montreal processes are compiled as illustrative presentations with graphs, tables and photos, and are primarily aimed at providing communication tools for the professionals and experts as well as for public audiences. On the other hand several reports of the Montreal Process countries and also the reports from ITTO countries are mainly aimed at reporting purposes for the experts and professionals.

The country reports are compiled in various ways: by a group of scientists or group of various experts and other stakeholders and the work is coordinated by governmental authorities or experts. For the Swiss and Austrian reports various scientists have been responsible for the writing of each of the indicators. In Finland a steering committee consisting of various stakeholders has met several times during the course of the writing of the report, providing guidance and agreeing on the main messages, but the writing and data compilation has been performed by scientists. This ensured that the necessary political commitment was integrated in the reporting process. In the U.S.A. a multi-stakeholder forum has been created, called "Roundtable on Sustainable Forests", which oversaw the compilation of the report and therefore showed its commitment to the process.

3.2. Characteristics of the international (regional) forest report summaries

The publication "Europe's Forests in the Spotlight" is mainly based on forest resource assessment data of UNECE/FAO (2000), FAO (2001) and additional information collected by UNECE/FAO and the MCPFE in 2002. This aim of the publication was to present up-to date information on the state of Europe's forests, comprising data from 40 European countries of the

7 Additional indicator.

MCPFE. The publication was prepared for the occasion of the Living Forest Summit in Vienna, the MCPFE Conference 2003.

The purpose of the Montreal Process first forest overview report 2003 is to highlight for policy makers, other stakeholders and the international community the progress in the use of criteria and indicators as reflected in the country forest reports. It should be noted that these are highlights and, as such, do not represent an assessment of the sustainability of forest management in Montreal Process countries. The report was prepared for the World Forest Congress 2003.

The ITTO summary report on the Status of Tropical Forest Management 2005 is based on the data collected from country reports and other complementing relevant sources. The report provides a comprehensive analysis on the forest management situation in all 33 of ITTO producer member countries. It addresses the policy and institutional settings in each country, the approaches taken to allocation and management of resources, and the status of management of those resources. The report is aimed for wide audience and international community at global level.

In all regional reports of the MCPFE, Montreal and ITTO the progress in the use of C&I or the status of forests has been illustrated by the selection of indicators. In the MCPFE and in the Montreal Process 12 and 9 indicators, respectively, have been selected representing the coverage of all 6-7 criteria.

Decision makers have utilized these summaries to support their agenda. For example in the ITTO summary report the indicators relating to Permanent Forest Estate (PFE) have been emphasized providing a very clear indicator over the trends in forest area changes.

4. Use and audiences of the national forest sustainability reports

4.1. Providing data for international sustainability reports

Country forest reports based on C&I sets are a logical principal tool for reporting, monitoring and assessing the status of forests at an international and national level. At an international level the reporting is mainly aimed at monitoring the progress of the implementation of commitments. The main global conventions and processes including forest issues are UNFF[8], CBD[9], CSD[10], OECD[11] and UNFCCC[12].

The regional forest criteria and indicator reports such as the MCPFE, Montreal and ITTO reports are particularly important by providing an overview of regional summaries. They provide information adjusted to the regional circumstances with regional emphasis and variations.

There is a need for further harmonization at an international level reporting on the whole process, not only in the definitions and terms. In order to reduce the reporting burden and to avoid overlapping work, clarifications are needed on the linkages between national and international reporting. How the reports can simultaneously serve both goals and how the reporting processes such as gathering the information, timing of reporting and cooperation between the agencies are organized. The aim should be that the information can be reported and verified, and then

8 United Nations Forum on Forests.

9 Convention on Biological Diversity.

10 Commission on Sustainable Development.

11 Organisation for Economic Cooperation and Development.

12 United Nation's Framework Convention on Climate Change.

used for different purposes without reducing the quality. In Europe this has been achieved, to a limited extent, through the collaboration between ECE/FAO and the MCPFE.

Often the national reports using the international C&I frame provide more information than required for international purposes, this is because the reports are also used for national purposes and therefore often go into great detail. For the international reporting the heterogeneity and diversity of countries should be taken into account. Furthermore not all aspects are suitable for harmonizing. Focusing on the main messages and increasing the clarity of the reports may lead to concentrating on the most important, common, easy measurable and cost effective indicators.

4.2. Tool for forest policy and strategies

The main use and application of the country forest reports is to assist the forest policy formulation, setting goals and monitoring the implementation of national forest programs and policies. Political commitment on the national level is essential for the development and implementation of the criteria and indicators. The national reports have also been a framework for federal and local applications. For instance the State of Oregon in the U.S.A. has compiled a sustainability report and used it as the basis for their strategic plan and forest program. Whilst in Finland the national forest report has been used as the frame for the evaluation of the impacts of regional forest programs.

The country reports can have various roles according to the commitment shown during the political processes. In Poland the National Forest report is a requirement of the Forest Act and is formulated annually. When compiled it is presented by the forest authority to the Minister of Environment and edited for the public audience. On that basis a concise forest report with selected indicators is then presented to the Council of Ministers. Finally the information on the state of the forests is presented at the meeting of the Parliament's Commission for Environment in order to be accepted by the Parliament's plenary session.

The Liaison Unit Warsaw of the MCPFE conducted a survey in 2004 on National Forest Programs in Europe. 22 countries took part in the research. Continuous evaluation of National Forest Programs was carried out in most of the countries, 50% of the respondents reported that the criteria and indicator set was a component of National Forest Program. Both the MCPFE C&I as well as national criteria and indicators applications were used for monitoring. Often also base lines were set for evaluation. More often the MCPFE indicators were applied partially as a set with 35 indicators.

In the country reports of Australia and Finland, data are presented without value-based interpretations. This allows the readers to judge the findings themselves as to whether a trend in a particular indicator is positive or not, depending on their own perspectives and preferences. Other approaches have been used, for instance in the country reports of Austria and Switzerland where political recommendations have been made for the whole forestry sector and also recommendations for the required actions for individual indicators have been provided.

Being a compendium of information from various sources and sectors related to forests the national reports encourage significant stakeholder participation. Forest criteria and indicators can also be included in other related sector reports and activities such as water, energy, mining, biodiversity, agriculture and public health. The national report can therefore considerably help to improve the understanding and coordination between the sectors. In the U.S.A. the development of criteria and indicators has been stakeholder oriented with the goal of creating the legitimacy and political commitment for the criteria and indicators.

4.3. Forest management

The international commitments on criteria and indicators need to be applied to forest management practices and guidelines. There are numerous examples of the operational uses of criteria and indicators. It can be said that through criteria and indicators the concept "sustainable forest management" can be made both visible and understandable in a very concrete way – in other words a transfer from the paper to the field.

The worldwide operational application of criteria and indicators is forest certification. Within the MCPFE the Pan-European Operational Level Guidelines are designed for sub-national applications at a practical level, and can be used for management guidelines for forest owners, employees and contractors as well as for communication and educational purposes.

ITTO criteria and indicators can be used for different purposes, for example in India they have successfully been used at a local level for training and capacity building. Whilst in Honduras criteria and indicators are applied for pine forest management at management level unit. In U.S.A. a booklet called "A Stewardship Handbook for Family Forest Owners" has been created for practical applications by forest owners. The recent development in the MCPFE is the integration of the preservation of cultural objects with forest management operations according to the Vienna Resolution V3.

4.4. Public information on forests

Three types of national forest reports can be distinguished; technical ones with the whole set of indicators including only a few illustrations, technical reports with comprehensive explanations of every single indicator with plenty of colorful figures and photos, and short summarized illustrated reports or brochures with a reduced number of indicators. There are no surveys available on how the users view or utilize those reports.

To make the reports attractive for public audiences and decision-makers it is necessary to reduce text to a minimum and add illustrative aspects such as maps, photos, simple figures and graphs. Useful feedback has been received from the top level decision makers in Finland (The Committee of Sustainable Development led by the Prime Minister and included 5 other Governmental Sector Ministers) on a brochure with a reduced selected set of indicators (8) showing graphically the main characteristics over the status of Finnish forests (Sustainable welfare from biologically diverse forests). A similar publication has been produced in Australia as a summary of the national five-yearly report over the state of forest report (see also the recommendations in Guatemala 2003).

In the Australian summary report, 12 indicators have been selected to show the main characteristics of the forests: land area of major types of forests illustrated using a map, commercial plantations, old-growth forests, forest tenure and management again presented with a map, conservation, biodiversity (represented by the number of endangered species), forest products, forest health, value of timber, investment and employment, tourism and recreation and issues relating to indigenous people. In the Finnish brochure the 8 graphical indicators were: (1) forest area in comparison to other European countries, (2) forest ownership, (3) annual increment and drain of the growing stock, (4) strictly protected forests in comparison to other European countries, (5) forest health, (6) employment in forestry, (7) recreation and (8) wood-based fuel consumption for energy. In both publications several combined indicators have been produced.

4.5. Impact of C&I sets and reports on forest research and other research initiatives

Country forest reports and the use of C&I sets are excellent examples of science/policy interfacing. The main elements of the compilation of the country reports are research results and the information gathered by monitoring the forests and forest resources. The reporting process has highlighted several weaknesses and information gaps, which have influenced the launching of new research topics, harmonizing the terms and definitions and linkages, collaboration with other sectors and strengthening data collection procedures and capacities. New indicators such as cultural aspects and values, expenditures on services, non-timber products, anthropocentric influence, classification of the protected forest areas, dead wood component, landscape pattern and fragmentation shows that often multidisciplinary approaches are required, new methodologies have to be developed, or old results have to be reanalyzed in order to fulfill the new requirements Today these issues are on research agendas both nationally and internationally.

Research networks and institutes such as IUFRO[13], EFI[14], UNU[15], IPGRI[16], CIFOR[17] and IIASA[18] are closely linked with the MCPFE, Montreal and ITTO processes and forest policy discussions. Within IUFRO a task force topic on sustainable forest management has been established, which correlates closely with the development of C&I discussions on the political level. In the IUFRO World Congress 2005 in Brisbane, a special sub-theme was organized for demonstrating sustainable forest management.

In the MCPFE Living Forest Summit 2003 in Vienna the scientific community stressed the importance of science, research and capacity building for knowledge-based, innovative forest policy formulation and its successful implementation. One result of this collaboration is the participation of the scientific community through research and conferences in the follow-up of the implementation the MCPFE resolution.

Forest sustainability reports also have significant influence on research policies and strategies. In Europe many COST[19] Actions have been created according to the developments of C&I and related reporting. Examples are COST E 27 (PROFOR) on the "Protected Forest Areas in Europe – analysis and harmonization", where the assessment guidelines of protected forest areas agreed by the MCPFE have been analyzed. The COST Action E 43 on "Harmonizing of National Forest Inventories in Europe: techniques for common reporting" is one other example on the collaboration between the scientists relating to the developments of C&I by measuring SFM.

The European Commission has established the concept of a "Technology Platform" as a vision for 2030 for research in order to promote an integrated research approach based on private-public partnerships. Within this frame more that 1000 forest based representatives from some 20 countries have been actively engaged in this process, and a Forest – Based Technology Platform has been created during the period 2003-2006. The C&I frame contributed for this development as a central tool. The result has been a wide-ranging pool of research proposals (over 700).

The scientific community should remain engaged in the development and use of criteria and indicators. More scientists should be involved in the dialogue and meetings regarding C&I in order to create a direct link between science and policy.

13 International Union of Forest Research Organizations.

14 European Forest Institute.

15 United Nations University.

16 International Plant Genetic Resources Institute.

17 Center for International Forestry Research.

18 International Institute for Applied Systems Analysis.

19 European Co-operation in the Field of Scientific and Technical Research.

4.6. Forest certification

There is a close connection between the criteria and indicators for sustainable forest management and forest certification. The primary differences rest in the degree to which the procedures are binding and the thresholds of the criteria and indicators are set. Forest certification sets the standards for sustainable forest management by open stakeholder consultation and consensus.

Voluntary forest certification was introduced in 1993 as a market-based tool to inform wood products consumers that certified products come from forests that are managed in a sustainable way. Forest certification is directed primarily to the management of multifunctional forests, plantation forests or other wood production forest areas. Certification auditing against the agreed standards is always carried out by a third, independent party, which issues certification (a label) to those forests that meet the conditions.

Forest certification is in itself only one means of promoting sustainable forest management, and it cannot replace the forestry infrastructure created by legislation, national agreements, forestry financing systems and active organisations. Both tools; C&I and forest certification have a common goal, to promote sustainable forest management, and can be considered to be complementary. In 2006 more than 260 million hectares of forests (5-6%) were certified to various certification systems in the world.

Two global certification systems: PEFC[20] and FSC[21] are in operation. PEFC is based on the internationally agreed concept on sustainable forest management and internationally used rules and procedures on certification processes. The PEFC uses the the internationally agreed thematic areas agreed between the regional processes (MCPFE, Montreal, ITTO, Tarapoto, African Timber Organization, African Dry Zone, Near East, Dry Forest Asia, Lepaterique). Those thematic areas are: (1) extent of forest resources, (2) forest health and vitality, (3) productive functions of forests, (4) biological diversity, (5) protective functions of the forest, (6) socio-economic benefits and needs, (7) legal, policy and institutional framework.

The PEFC frame includes, in 2006, 32 independent national forest certification systems representing all continents and 22 endorsed forest certification schemes. Examples are Finnish Forest Certification System, Living Forest Standards Norway, PEFC Sweden, PEFC Czech Republic, CSA Sustainable Forest Management Program-Canada, INMETRO Brazil, Certfor Chile, Sustainable Forest Initiative (SFI) – in USA, Malaysian Criteria and Indicators for Forest Management Certification (MC&I by MTCC[22]), PAFC Gabon[23] and Australian Forest Certification Scheme, which are endorsed by PEFC.

The FSC certification system uses ten general principles of good forest stewardship. They also incorporate the principles for the sustainable ecological, social and economic management of forests, but they are not directly linked to international conventions or agreements on sustainable forest management. The general principles are often adopted into the national applications within the FSC national working groups, but FSC also operates in the countries according to the global general principles. In several countries both certification systems FSC and PEFC operate such as in Canada, Brazil, Sweden or the United Kingdom.

As a market driven tool forest certification is an effective method of raising awareness of forestry in society. By creating a positive image of the renewable material, wood, certification can promote

20 Programme for the Endorsement of Forest Certification Schemes.

21 Forest Stewardship Council.

22 Malaysian Timber Certification Council, not yet endorsed by PEFC.

23 Not yet endorsed by PEFC.

sustainability in comparison to other non-renewable raw materials. The crux of the international debate on the merits of each scheme is what constitutes a credible certification scheme and whether or how cooperation between individual schemes should be arranged. Mutual recognition has been proposed as one of the solutions to the problem of proliferation of national certification schemes.

5. Linkages of national forest reports with the other sector's reports

Sectors that are linked to forestry should, logically, use forest indicators in their reporting: economic reports rely on socio-economic forest indicators, biodiversity reports on forest biodiversity indicators etc. Most often forest indicators are included in the national environmental, biodiversity or nature reports. Examples are State of the Environment of Australia, Nature Report 2005 of the State of Nature in Flanders, Belgium, Italy's Environmental Data Yearbook 2004, The State of the Nation's Ecosystems: Measuring the Lands, Waters, and Living Resources of the United States and the biodiversity indicators for monitoring the implementation EU Biodiversity strategy 2010. Indicators used for those sector reports are closely related to the forest biodiversity indicators. Often only a few forest indicators are used, such as forest area, protected forest area, threatened species or invasive alien species.

In Finland indicators for renewable natural resources (agriculture, forestry, fisheries, game and reindeer husbandry, water resources and natural resources and rural development) was developed in 2004. Forest indicators included in this report are growing stock volume, age class structure of forests, protected forest areas and employment in forest sector with real earnings.

The use of forest indicators in other sector's reports is very important for synergies and awareness of forest issues. The tendency is to use only a few forest indicators and combine the single indicators. There is a need to communicate with other sectors which forest indicators could be selected in order to give a balanced and focused view on the forests and its uses.

6. Conclusions and recommendations

The country reports based on criteria and indicator sets provide a balanced compendium of information on the status and trends of sustainable forest management. The main uses of national forest reports are: providing data for international sustainability reports, tools for forest policy and strategies, forest management, public information on forests, impact on forest research and other research initiatives and forest certification.

While demand for various reporting is increasing, the aim should be that the information can be reported and verified, and then used for many different purposes. Therefore clarifications are needed on the linkages between national and international reporting and on the reporting processes.

Various reports are needed also for various audiences. For professionals and experts comprehensive reports are the most suitable and useful, but for public audiences and top level policy decision makers reports with simple messages and reduced number of selected indicators are more relevant. A reduced set of forest indicators are also required by other sector's for their report formulation.

Further discussions are required for the selection of the most prominent indicators and combined indicators for emphasizing the key elements of sustainable forest management. From the political point of view is important to outline how the criteria and indicators are presented in country reports; without value based interpretations or with providing clear political messages.

References

Country (9) and international reports (3) presented in the Appendix 1.

Annual Review 2005. Sustainable Forest Management is based on environmentally, socially beneficial and economically viable management of forests for present and future generations. PEFC Council, Programme for the Endorsement of Forest Certification Schemes.

Expert Consultation on Criteria and Indicators for Sustainable Forest Management, 2-4 March 2004, Cebu City, Philippines.

Criteria and indicators of sustainable forest management, Report of the Secretary-General. United Nations Economic and Social Council, 3 March 2004.

International Conference on the Contribution of Criteria and Indicators for Sustainable Forest Management: The Way Forward, Volume 1, CICI-2003, 3-7 February 2003, Guatemala City, Guatemala.

International Conference on the Contribution of Criteria and Indicators for Sustainable Forest Management: The Way Forward, Volume 2, CICI-2003, 3-7 February 2003, Guatemala City, Guatemala.

APPENDIX 1. The use and audiences of national and international sustainability reports

1. National

1.1. MCPFE process and three case studies: Austria, Finland and Switzerland

The "MCPFE Process" (Ministerial Conference on the Protection of Forests in Europe) deals with criteria and indicators for sustainable forest management in Europe, e.g. on the development of Pan-European Criteria and Indicators for Sustainable Forest Management (SFM) in Europe. The process includes boreal, temperate, alpine and Mediterranean-type forests. The first set of Pan-European Indicators for SFM had been developed in 1993–1995. At the Lisbon Conference in 1998, the Ministerial Conference on the Protection of Forests in Europe (MCPFE) decided to improve the existing set of Pan-European Indicators for Sustainable Forest Management. The improved Pan-European Indicators for Sustainable Forest Management have been adopted at the MCPFE in 2003 Vienna. About 40 participating countries have agreed on a set of 6 non-legally binding criteria and 35 quantitative indicators for sustainable forest management for national implementation. In addition the set includes two types of qualitative indicators: A) overall policies, institutions and instruments for SFM and B) policies, institutions and instruments by 12 policy areas.

The three case studies

Country	Publication	Technical details	Source
Austria	Sustainable Forest Management in Austria. Austrian Forest Report 2004	English, 112 pages, available via Internet as PDF format	http://www.forstnet.at/article/archive/4922
Finland	The State of Forestry in Finland 2000. Criteria and Indicators for Sustainable Forest Management in Finland	English, 104 pages, available via Internet as PDF format	http://www.mmm.fi/english/forestry/publications/
Switzerland	Forest report 2005. Facts and figures about the condition of Swiss forest	available in English, French, German or Italian, 151 pages, available via Internet as PDF format or as hard copy	http://www.umwelt-schweiz.ch/buwal/eng/fachgebiete/fg_wald/rubrik2/waldbericht/index.html

1.1.1. Austria

For what purposes, scope and audience

One of the main tasks of the Life Ministry is to gather and publish all significant data and information about Austria's forest sector, and to inform the public about the many different functions of the forest. The most important forestry related reports published regularly by the Life Ministry are the Austrian Forest Report together with the pertinent data collection, the Green Report, and the Game Damage Report. Reporting also includes replying to inquiries and providing data and information for the Ministry. Audiences are: policy makers at the national and regional level, civil servants dealing with forest issues at the national and regional level, interest groups (forest owner association, chamber, etc), NGOs and other forest relevant stakeholders, and broad public.

Form of the report, available statistics and their sources, compiled and arranged by whom

The Austrian Forest Report 2004 is structured according to the Pan-European Criteria and Indicators agreed upon by the MCPFE 2003 in Vienna and covers the period from 2002 to 2004. The report is based on all the available data from statistical surveys conducted by

various agencies (e.g. Institute for Forest Inventory, Austrian Forest Soil Condition Survey (FSCS) etc.), as well as the expert opinions of numerous experts. The Report has been compiled and arranged by the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management, Division IV/1 – Forest Policy and Forest Information. A team of various scientists have contributed to each chapter. In some cases individual scientist has been responsible for the writing of a single indicator chapter.

Graphical design, tables, trends

The Austrian Forest Report 2004 is clear structured. The report presents statistics based on the MCPFE criteria, informative tables and maps. In each chapter a short summary at the end of the description of an indicator is included. Progress since the last Austrian Forest Report 2001 is not mentioned. The report includes long time series which illustrate trends within certain indicators during the last 5 to 10 years.

Remarks

For the indicator "landscape patterns", which is of relevance not only within the scope of MCPFE, but is also subject to reporting within the scope of the Alpine Convention (indicator 57), the OECD (Agri-Environmental Indicator IV.7), and the European Environment Agency (indicator BDIV06a), there is no recognised international survey method to date, and therefore no data available for the whole of Austria.

Indicator "Protective Forests – Soil, Water and Other Ecosystem Functions". As a terrestrial sample survey alone will probably not be sufficient, it will have to be combined with remote surveying methods. Until now, the protection forest surveys have generally been characterised only as expert appraisals. Here, too, reproducible measurements are to be applied more frequently in future.

The documentation did not mention difficulties in collecting the data for indicators.

1.1.2. Finland

For what purposes, scope and audience

The State of Forestry in Finland 2000 Report is the second national report; first published in 1997. The third national report of Finland will be published in 2006. This forest report can be used in the outlining of Finnish national forest policy, the monitoring and revision of forest programmes, in forest certification, and in reporting on progress in the sustainable utilisation and management of forests. It also provides reliable information on the state and trends of sustainable forest management in Finland for all people interested in forests, both in Finland and abroad.

Form of the report, available statistics and their sources, compiled and arranged by whom

This documentation from the year 2000 is structured according to the Pan-European Criteria and Indicators agreed upon by the MCPFE in Lisbon 1998. The report is based on all the available data from statistical surveys (e.g national forest inventory data) conducted by various agencies (e.g. Finnish Forest Research Institute (METLA), the Forestry Development Centre Tapio, the Finnish Environment Institute, and the regional Forest Centres and Environment Centres). A multistakeholder steering group for the compilation of the report was nominated by the Ministry of Agriculture and Forestry. The compilation itself was made by experts of METLA.

Graphical design, tables, trends

The State of Forestry in Finland 2000 Report is clear in structure. The report presents statistics based on the MCPFE criteria. Key messages are presented at the beginning of each chapter. The report includes statistics, informative tables and maps. Since the first list of criteria and indicators in 1997 was drawn up, international discussion on the concept of sustainability has evolved, new research data on the different dimensions of sustainability have become available, and general interest in the sustainable management of forests has increased. For all these reasons, the revised criteria and indicators set from 1997 to 2000 differs especially in qualitative indicators from the previous list. The third national report, currently under compilation, is based on the revised criteria and indicators set of the MCPFE Vienna 2003 and will be published in 2006. The report 2000 includes long time series, partly since 1920's (first national forest inventory conducted), and trends within certain indicators during the last 10 to 20 years.

Remarks

Collecting the data proved to be more demanding than expected. Some parameters that had proved to be effective indicators of sustainability were difficult to express in numerical terms, or there was no comprehensive statistical data available on them. Special studies are still required as up to date information on biodiversity and socio-economic functions is insufficient. In order to develop the monitoring of sustainability in forestry into a transparent, continuous and efficient system, the whole reporting systems for gathering data must be clarified and improved.

1.1.3. Switzerland

For what purposes, scope and audience

Forest Report 2005 presents, for the first time, a complete picture of the state of the forest in Switzerland and of its significance for the Swiss population. This should enable to move beyond the current one-dimensional discussion, with its focus on the number of defoliated tree crowns, which does not do full justice to the forest and its significance. The report is clear tailor made for a wide audience.

Form of the report, available statistics and their sources, compiled and arranged by whom

The publication is structured according to Pan-European Criteria and Indicators agreed upon the MCPFE Vienna 2003. The report is based on all the available data from statistical surveys (e.g. Schweizerische Forststatistik, National Forest Inventory etc.) conducted by various agencies (e.g. Swiss Federal Statistical Office). Individual scientist has been responsible for the writing of a single criterion or indicator chapter.

Graphical design, tables, trends

This documentation is structured according to the MCPFE Criteria and Indicators frame. Each chapter includes a key message, statistics, informative tables and maps. This is the first forest report of Switzerland, but the report includes long time series which illustrate trends within certain indicators up to 30 years.

Remarks

The documentation did not mention any difficulties in collecting the data for indicators. "*Secondly, we are still putting a strain on the forest by exposing it to pollutants that pose a long-term threat, whose effects are difficult to estimate.*"

1.2. Montreal Process and three case studies: Australia, Japan and U.S.A.

Montreal Process Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests (Montreal Process).

In February 1995 in Santiago, Chile, the member countries endorsed the "Santiago Declaration", a comprehensive set of 7 non-legally binding criteria and 67 indicators for SFM of temperate and boreal forests for use by their respective policy makers at the national level. The Montreal criteria and indicators for SFM include temperate and boreal forests in 12 countries outside Europe. Participating countries have agreed to review and consider possible elements for criteria and indicators at the forest management unit level. Montreal Process countries published in 2003 their **national reports on the framework of criteria and indicators.**

All Montreal Process members were required to prepare and publish a national report in 2003. At present, no member country is able to submit data on all of the 67 indicators and only three members including Japan can submit data on more than 70% of the indicators. Difficulties for the member countries to report on the indicators are due to various reasons such as that **relevant data are not collected, national consensus on data-collecting methods has not been built**, and that it is **difficult to scientifically interpret collected data.**

The three case studies

Country	Publication	Technical details	Source
Australia	Australia's State of the Forests Report 2003	English, 408 pages, available via Internet as PDF format or as hard copy	http://affashop.gov.au/product.asp? prodid=12858
	Australia's State of the Forests Report 2003 – Summary	English, 11 pages, available via Internet as PDF format or as hard copy	http://affashop.gov.au/product.asp? prodid=13171
Japan	Montreal Process First Country Forest Report (2003 Report)	Excerpt in English, 11 pages, available via Internet as PDF format, main report in Japanese	http://www.mpci.org/rep-pub/2003/2003japan_e.pdf
U.S.A.	National Report on Sustainable Forests – 2003	English, 139 pages, available via Internet as PDF format	http://www.fs.fed.us/research/sustain/documents/SustainableForests.pdf

1.2.1. Australia

1.2.1.1. Australia and its State of the Forests Report 2003

For what purposes, scope and audience

This State of the Forests Report by Australia will reach an international audience and present, to the world community, information describing Australia's forest estate and management. Also Australians expect that trends in the condition of their forests are

monitored and reported on to help with policy development, decision making and continuing to improve forest management.

Form of the report, available statistics and their sources, compiled and arranged by whom

The State of the Forests Report 2003 is structured on a nationally agreed framework based on the Montreal Process criteria and indicators. Seven broad criteria and 74 indicators were developed during regional consultations with forest management and conservation agencies and other stakeholders. The main source of data for the different sections was the National Forest Inventory (2003) and data from the Department of the Environment and Heritage. The datasets and tables are presented without a value-based interpretation. Australia's next State of the Forests Report will be published in 2008.

The State of the Forests Report 2003 was compiled and arranged by key authors and a drafting group from governmental organisations, a National Forest Inventory Steering Committee, a Montreal Process Implementation Group members and private consultants.

Furthermore, there is a summary report of Australia's State of the Forests Report 2003 available. The summary report contains selected facts, figures, tables and maps designed from the original comprehensive report.

Graphical design, tables, trends

The report includes key messages or summaries at the beginning of each chapter, statistics, informative tables and maps. Since the first report in 1998 much has been changed in forest management and in Australian Government – State relations to help gain a clearer picture of the national forest estate. For example, Regional Forest Agreements (RFAs) require criteria and indicators to be used in their regular periodic reviews.

Several national vegetation-related initiatives have also developed. In 1997 the National Land and Water Resources Audit established the National Vegetation Information System to compile a national vegetation dataset. The Australian Greenhouse Office's National Carbon Accounting System continued to produce updated vegetation related information. The most recent State of the Environment Report, which includes forest-related issues, was published in 2001. The National Forest Inventory is a participant in all of these national initiatives.

Remarks

Data were not available for some indicators because the necessary monitoring and management systems were not always in place. Many indicators remain incomplete and may need further research, e.g. Indicator 1.2 Species Diversity: "*To report fully on this indicator it is important to identify and monitor key indicator species, aggregate all existing distribution, population, condition and trend information, and target surveys to fill gaps in information. On the whole there is still academic debate on what are appropriate species and functional groups that indicate where environmental change is having a significant impact on biodiversity.*"

1.2.2. Japan

For what purposes, scope and audience

The ultimate goal of C&I initiatives is to clearly demonstrate the progress toward SFM and to identify the trends of relevant data on individual indicators, thereby providing materials for policy-makers to make the best decisions and offering feedback for the policy-making processes.

Form of the report, available statistics and their sources, compiled and arranged by whom

This excerpts report is a short version of the original report compiled in Japanese. This is the first report concerning forests in Japan that is prepared based on the Montreal Process criteria and indicators. In compiling Japan's 2003 Country Forest Report, data were collected mainly from administrative information owned by relevant authorities, but it is desirable for wider range of stakeholders including researchers to evaluate and discuss the paper. The various parties concerned are expected to be involved in C&I initiatives, and from such a perspective, the authors of the Japanese report hope that as many parties as possible will be able to make use of this paper.

Graphical design, tables, trends

The report submits data on 50 out of 67 indicators, while addressing results of case studies as well as details of the projects that are currently being implemented but have yet to come to a conclusion with respect to the other 17 indicators. The original report (in Japanese), based on the Montreal Process criteria, does include statistics, tables and maps.

The original report includes long time series which illustrate trends within certain indicators during the last 20 years.

Remarks

The **first issue** is how this paper shall be evaluated. The sustainability of forest management should not be assessed in an isolated manner based on each individual indicator but comprehensively based on all 67 indicators as a whole.

The **second issue** is related to the use of C&I as domestic tools for forest policies. More specifically, the next step will be a process of designing future policies with the use of knowledge and information that have been acquired through the implementation of monitoring, assessment and reporting of data on 67 indicators. Therefore, in order to use C&I as a basic policy framework, it is necessary to clarify, to some extent, the targets or desired states for individual indicators; otherwise, it would be extremely difficult to objectively assess the information acquired from the measurement of indicators.

The **third issue** is a global compatibility of initiatives in different countries. The Montreal Process is basically related to domestic efforts in individual countries to demonstrate the sustainability of their forest management, but at the same time, it is a global approach to share knowledge and information among member countries based on a common understanding toward the sustainability of forest management on a global basis. However, when conducting global comparisons, it is always necessary to take into consideration specific conditions in individual countries.

The **fourth issue** is harmonization with an approach toward forest certification.

1.2.3. U.S.A.

For what purposes, scope and audience

The goal is to provide information that will improve public dialog and decision making on what outcomes are desired and what actions are needed to move the Nation toward this goal. The intention is to establish a baseline for future measurement of our progress. The indicators used reflect many of the environmental, social, and economic concerns of the American public regarding forests. While the report presents data primarily at a national or regional scale, it also provides a valuable context for related efforts to use the indicators to measure progress at such other geographic and/or political scales as ecoregions, States, watersheds, and communities. The report profiles examples of actions that public and private forest managers and stakeholders at all scales are currently implementing to improve forest management and forest conditions in the United States.

Form of the report, available statistics and their sources, compiled and arranged by whom

The report addresses individually each of the 67 Montreal Process indicators. For most indicators, the presentation includes a graphical display of the data, an explanation of what the indicator is and why it is important, a narrative description of what the data shows, and, in some cases, an explanation of current limitations in reporting on the indicators. The presentation of each indicator is limited to one page. The report contains a summary discussion of each of the seven criteria, explores relationships among the C&I, and presents some approaches to interpreting the information.

Data for indicators are from the USDA Forest Service Forest Inventory and Monitoring Program, from the U.S. Bureau of the Census and from various other sources. An evaluation on the quality of data and on the capacity to measure and monitor the data has been carried out. The results was that around 15% of the data is current and consistent across the entire Nation and come from programs whose funding and longevity are reasonable assured.

The criteria and indicators were derived from a multistakeholder process. The national report was prepared by a core team composed of the U.S. Fish and Wildlife Service, the U.S. Geological Survey and the USDA Forest Service. Criterion team leaders each provided leadership to a team of indicator specialists in preparing the individual indicator reports and criteria summaries.

Remarks

Along with a need to review and possibly revise indicators, there is a need to further develop the concept of reference conditions (also commonly termed reference values, desired future condition, or natural condition) for each indicator.

While regional reports probably would be possible, the need for reports at smaller and smaller scales will always exist, and the number of possible reports would be prohibitive. A better approach would be to improve accessibility of the data at local levels and provide an automated procedure for summarizing and analyzing the data at that level. This is already possible with some datasets; but producing a report on all the indicators at a local level would be especially challenging because of the difficulty in accessing and merging all the data.

1.3. ITTO process and three case studies: Ghana (ATO/ITTO), Malaysia and the Philippines

International Tropical Timber Organization (ITTO).

The ITTO Criteria and Indicators were elaborated in 1992 for the assessment of management and progress towards sustainability in forestry. In 1998, ITTO prepared and published a document "Criteria and Indicators for Sustainable Management of Natural Tropical Forests", to update the original C&I taking into account subsequent developments in this field to reflect experience gained from tropical countries and developments related to improved understanding of the components of SFM. Parallel to this process, the Organization has developed guidelines for various SFM activities, including sustainable management of natural tropical forests (1990) and planted tropical forests (1993), as well as for conservation of biological diversity in tropical production forests (1993) and for fire management (1997). The Process identified 7 criteria and 66 indicators applicable both at the national and forest management unit levels in humid tropical forests of member tropical countries. The revised version of 7 Criteria and 57 Indicators was published in 2005.

African Timber Organization (ATO).

The development of the first set of Principles, Criteria & Indicators (PC&I) for the management of the African tropical forest was started in 1993 and it was adopted by the ATO Ministerial Conference in 1996. In 2003, a harmonized ATO/ITTO publication on principles, criteria and indicators was produced. Three countries have developed their national principles, criteria and indicators (Cameroon, Gabon and Ghana).

The three case studies

Country	Publication	Technical details	Source
Ghana	Reporting questionnaire for indicators. At the national level 2004	English, WORD Format, 88 pages, ITTO designed questionnaire for collection of information on those indicators relevant at the national and forest management unit levels	ITTO secretary
Malaysia	Criteria and indicators for sustainable management of natural tropical forests. Reporting questionnaire for indicators at national level 2003	English, WORD Format, ITTO designed questionnaire for collection of information on those indicators relevant at the national and forest management unit levels	ITTO secretary
the Philippines	Second National Report of the Philippines: Criteria and indicators for sustainable management of natural tropical forests 2005	English, WORD Format, ITTO designed questionnaire for collection of information on those indicators relevant at the national and forest management unit levels	ITTO secretary

1.3.1. Ghana

Form of the report, available statistics and their sources, compiled and arranged by whom

This is the first report concerning forests in Ghana that is prepared based on the ITTO Criteria and Indicators. Ghana has developed according to the ITTO guidelines its own national principles, criteria and indicators. The questionnaire was compiled by the Forestry Commission (FC) of the Ministry of Lands and Forestry, Ghana. In compiling Ghana's

2004 Questionnaire, data were collected mainly from administrative information e.g. Forestry Commission, Forestry Research Institute of Ghana, IRNR, KNUST and University of Development Studies (UDS).

Graphical design, tables, trends

The structure of the report is based on Ghana's national principles, criteria and indicators. The documentation provides for most of the indicators statistical data (e.g. forest resources, wood and non-wood products, protected area, endangered forest-dependent species etc.) and maps. Although the collecting of data is difficult, Ghana is taking great steps forward in reporting on criteria and indicators for sustainable management.

Remarks

Indicator 5.5: Percentage of original range occupied by selected endangered, rare and threatened species.

Note: Where good historical information is not available, it may be very difficult to give reliable information about this indicator. Even if the original range is not accurately known, however, successive records should give an indication of whether the range of these species is increasing or declining.

Criterion 6: Soil and water.

Note: True quantitative "outcome" indicators of the effects of forest management on soil and water are, therefore, such measures as soil productivity within the forest and data on water quality and average and peak water flows for streams emerging from the forest. This information is difficult and expensive to obtain and is seldom available for more than a limited number of sites, for each forest management unit has its own characteristics in this respect (slope, geological structure and the inherent erodibility of the soil type).

1.3.2. Malaysia

For what purposes, scope and audience

To co-ordinate and facilitate the implementation of criteria and indicators for SFM in Malaysia, a National Committee on Sustainable Forest Management was established in 1994 at the Ministry of Primary Industries, Malaysia. In 1994 Malaysia had developed a set of Malaysian Criteria and Indicators for SFM at the national and forest management unit levels which was based on the ITTO Criteria for the Measurement of Sustainable Tropical Forest Management. In 1999 Malaysian Criteria and Indicators for SFM were revised. Malaysia has also formulated criteria, indicators, activities and management specification for the purposes of forest management certification to be undertaken at the forest management unit level. The forest certification scheme was launched (by the Malaysian Timber Certification Council, MTCC) in 2001 and it involves the sustainability of the Permanent Forest Estate.

Form of the report, available statistics and their sources, compiled and arranged by whom

In compiling Malaysia's 2004 Questionnaire, data were collected mainly from administrative information e.g. Forestry Statistics (Peninsular Malaysia), Forest Information Management Unit (Sabah Forestry Department), Forest Department Sarawak etc.

Graphical design, tables, trends

The structure of the report is based on ITTO Criteria and Indicators. The report includes technical descriptions and statistics are provided for majority of the indicators. It can be seen that Malaysia is taking great steps forward in reporting on criteria and indicators for sustainable management.

The criteria and indicators formulated at the national level provide a common framework for monitoring, evaluating and reporting progress towards the attainment of sustainability of its forest resources, especially to ITTO and UNFF. Criteria and indicators formulated at the forest management unit level will be used to monitor and assess sustainable forest management practices at the field level. These criteria and indicators will be reviewed and refined periodically to reflect new concepts of sustainable forest management.

1.1.3. The Philippines

Form of the report, available statistics and their sources

In compiling Philippines's 2004 Questionnaire, data were collected mainly from administrative information e.g. Philippine Forestry Statistics: 2003.

Graphical design, tables, trends

The structure of the report is based on ITTO Criteria and Indicators. The documentation provides for most of the indicators statistical data and therefore The Philippines are taking great steps forward in reporting on criteria and indicators for sustainable management.

Remarks

Recently, the FMB and NAMRIA, both DENR agencies, interpreted and classified LANDSAT TM images from 2001-2003 to come out with this new estimate. This new forest cover data is still being refined with improved classification and ground validation.

Most data on indicators for soil and water are not available at present but there are procedures for the protection and management of sensitive areas that must be managed primarily for soil and water conservation.

2. International

2.1. Process overlooks

The three reports

Process	Publication	Technical details	Source
MCPFE	Europe's Forest in a Spotlight 2003	English, 8 pages, available via Internet as PDF format or as hard copy	http://www.mcpfe.org/publications/pdf/eforests_in_the_spotlight.pdf
Montreal	Montréal Process First Forest Overview Report 2003	English, 20 pages, available via Internet as HTML format or as hard copy	http://www.mpci.org/rep-pub/2003/overview/index_e.html
ITTO	Status of Tropical Forest Management 2005 Summary report	English, French and Spanish, 36 pages, available via Internet as PDF format	http://www.itto.or.jp/live/Live_Server/1222/ITTOSFMTropics2005_summary.e.pdf

2.1.1. MCPFE

Used for which purposes

The publication "Europe's Forest in a Spotlight" provides an overview of the status and development of SFM in Europe on the occasion of the Fourth Ministerial Conference on the Protection of Forests in Europe, the "Living Forest Summit". The purpose of this leaflet is to provide the most recent, objective, quantified and comparable data about SFM for around 40 European countries. It provides an updated information source for decision makers and other stakeholders and serves as a background document for new commitments. The report aims to give key facts and figures about Europe's forests for policy and decision makers at the "Living Forest Summit" and to inform a wider public in a comprehensive form.

Which indicators have been used

The publication "Europe's Forest in a Spotlight" is structured according to the Pan-European Criteria and Indicators, and provides information for a selection of the 35 indicators (see also Table 1).

Data source

The publication "Europe's Forest in a Spotlight" is a summary from the report "State of European Forests 2003" based on forest resource assessment data of UNECE/FAO (2000), FAO (2001), some additional information of other approved sources and updates of the forest resource assessment data, which were conducted by UNECE/FAO and the MCPFE in 2002. Additionally, new data on protected and protective forest areas were collected by UNECE and the MCPFE in 2002 according to the "MCPFE Assessment Guidelines for Protected and Protective Forest and Other Wooded Land in Europe".

Remarks

A special focus of the publication "Europe's Forest in a Spotlight" is on changes that occurred in European forests between former forest resources assessments and the recent updates provided specifically for this report. It shows the current status and achievements in SFM in Europe.

The data on indicator "defoliation" are not generally directly comparable with those of previous years due to differences in the sample sizes and changes in methods in some countries. "Non-wood forest products" are not seen as economically important in many European countries, and due to the difficulties and costs of collecting accurate data, many countries do not collect and report data on non-wood forest products.

2.1.2. Montreal Process

Used for which purposes

The purpose of the publication "Montréal Process First Forest Overview Report 2003" is to highlight for policy makers and forest managers, other stakeholders and the international community the progress in the use of criteria and indictors reflected in the Country Forest Reports. It should be noted that these are highlights and, as such, do not represent an assessment of the sustainability of forest management in Montreal Process countries. The report was prepared for the World Forest Congress 2003.

Which indicators have been used

The publication "Montréal Process First Forest Overview Report 2003" is structured according to the Montreal Criteria and provides information for a selection of 67 indicators (see also Table 1).

Data source

The publication "Montréal Process First Forest Overview Report 2003" is mainly based on data from the country forest reports.

Remarks

The publication "Montréal Process First Forest Overview Report 2003" illustrates the data found in the country reports for many more indicators. It does not represent an assessment of the sustainability of forest management in Montréal Process countries

Countries are not able today to report on all 67 indicators for one or more of the following reasons: data have not been traditionally collected (e.g. data on non-wood forest products), there is no scientific agreement on how the data should be collected, creating data gaps at sub-national levels (e.g. data on soil and water resources) and there is little or no scientific understanding of how to measure an indicator (e.g. forest fragmentation). Following indicators were indicated as difficult to measure: indicators related to biodiversity, non-timber forest products, soil and water conservation and carbon sequestration.

2.1.3. ITTO

Used for which purposes

The purpose of the publication "Status of Tropical Forest Management 2005 Summary report" is to provide a comprehensive analysis of the forest management situation in 33 member countries. Using information submitted by the countries and supplemented by data from a wide range of other sources, it addresses the policy and institutional settings in each country, the approaches taken to the allocation and management of resources, and the status of management of those resources. The publication includes fact sheets and summarises trends for each of the 33 member country.

Which indicators have been used

The publication emphasises especially on the indicator of PFE (Permanent Forest Estate). The indicator PFE includes three categories of forest: production forests on fragile lands, forests set aside for plant and animal and ecosystem conservation, and production forests. Furthermore it gives a descriptive picture on biological diversity, productive functions, protective functions, socio-economic functions (trade) and legal aspects (illegal logging).

Data source

The publication is mainly based on data form the country forest reports. Data on the area of forests in protected areas, and maps showing forest cover, were provided by the United Nations Environment Programme-World Conservation Monitoring Centre (UNEP-WCMC) and used to supplement data received from other sources. In addition to the summarized results on the Permanent Forest Estate a short overview on the forests for every single ITTO country has been presented.

Difficulties and development

The data of the report indicates that significant progress has been made since 1988 towards the sustainable management of natural tropical forests, but the extent of such progress remains far from satisfactory. Tropical forests are still lost every year, and unsustainable (and often illegal) extraction of tropical forest resources remains widespread.

Any comparison of findings from the 1988 and present surveys faces some obvious difficulties as comprehensive, reliable data were scarce for both surveys, although more data was available for the second than the first survey.

Table 1. Criteria and indicators used in the summary reports of MCPFE and Montreal Process.

	MCPFE	Montreal
Forest resources		
Area of forest, forest cover	x	x
Health and vitality		
Deposition of air pollutants	x	
Defoliation	x	
Damage of forest area	x(storm & insects)	x(fire)
Productive functions		
Total volume	x	
Balance between annual growth/fellings	x	
Area of forest land available for timber production		x
Biological diversity		
Forest types (conifers, broadleaved, mixed)	x	x
Forest undisturbed by man	x	
Protected forests (biodiversity + landscape)	x	
Protective functions		
Percentage protective forests	x	x
Socio-economic functions		
Forest ownership	x	
Employment in forestry	x	x
Public access	x	
Maintenance of forest contribution to Global carbon cycle		
Total forest ecosystem biomass and carbon		x
Legal, Institutional and Economic Framework		
Percent of Montreal Process indicators reportable and projections for five years		x

Logic Models for How Criteria and Indicators Relate to Each Other, and as a Set, to Sustainable Forest Management and Sustainable Development

Richard Guldin[1] & Theodore Heintz[2]

1. The Problem

The initial set of national reports on sustainable forests have been quite popular and useful in describing the current state of forests from an ecological, economic, and social perspective. However, during public review in the United States of the *National Report on Sustainable Forests – 2003* (USDA Forest Service 2004), a number of comments were received from scientists regarding the apparent lack of a well-defined model or framework to help readers understand the linkages among indicators. Some of those comments lamented not having a "systems" model. Ecologists, economists and social scientists each wanted a "systems" model drawn from their own discipline, thinking that was the most appropriate perspective for evaluating sustainability.

In addition to these comments, there was a substantial public discussion about the *meaning* of the information we reported. Many questions were raised for which we had no clear answer, despite all the data assembled and indicator descriptions. Some of these broader questions were:

- Are forests in the U.S.A. currently sustainable?
- Are the forests in the U.S.A. being managed in ways that meet the Montreal Process criteria for sustainable forest management?
- How should we assess the extent to which a criterion is being achieved when some of its indicators are improving while others are declining?
- How can one group see an indicator trend as an "improvement" while another group seeks the same indicator trend as a "worsening" of the sustainability situation?
- How do the conditions and processes addressed by these indicators affect forest conditions and processes that are not addressed by these indicators?
- What policies, management practices and other factors best explain the most positive trends? The most negative?
- What changes in policies and management practices are needed to better achieve sustainability in the U.S. forests?

Many of the scientists participating in public review commented that our ability to answer such questions was limited by the lack of a logic model or framework showing the relationships among the various types of conditions and trends addressed by the criteria and indicators (C&I). Policy and management analysts expressed difficulties relating indicators on policies and management practices to indicators on forest conditions or outputs. So whether readers' questions were narrow

1 Dr. Richard W. Guldin is Director of Policy and Quantitative Sciences for the Research and Development arm of the United States Department of Agriculture, Forest Service, in Washington, DC.

2 Mr. Theodore Heintz is Policy Analyst for the Council of Environmental Quality in the Executive Office of the President of the United States of America, Washington, DC.

or broad, functional or integrative, based on facts or interpretations, many struggled with putting all the information into an appropriate context and drawing meaning from it.

At the same time that the National Report on Sustainable Forests for the United States were being developed, other domestic indicator efforts were underway. At the request of the White House Office of Science and Technology Policy and the Council of Environmental Quality[3], The H. John Heinz III Center for Science, Economics, and the Environment launched a public-private venture to report on conditions in six natural resource sectors. Their initial report included two dozen indicators on forests (Heinz Center 2002). Also, the Comptroller General of the United States and other federal agencies were focusing on the performance of various health, education, and environmental programs, using indicators of various types.

With multiple indicator efforts underway in the U.S.A. that seemed similar, experts were often asked to compare and contrast the several indicator processes. Were their goals similar? Were there redundancies or duplication? Analyses of the several indicator efforts often recognized the value in having greater consistency among the processes and their indicators. If the various efforts could be integrated conceptually and logically, then greater meaning was likely to emerge and greater impact was likely to be created-benefiting all of them.

Integration is an important aspect of most concepts of sustainability. Most science and management, however, have followed the pathway of analysis and specialization, dividing the world into categories and subcategories in order to focus on a narrower set of phenomena and a simplified set of interactions. The notion of sustainability encompasses the idea that long-term human well-being and ecological sustainability both depend on complex patterns of interaction within and between the human and non-human elements of Earth's biosphere. To achieve sustainability, human actions must be based on an integrated understanding of these complex relationships as well as on specialized knowledge and skills. Spelling out the relationships is as vital to sustainability as identifying C&I.

2. In what ways has lack of a model hurt development or country use of C&I?

For some audiences, the sets of forest C&I are accepted as legitimate and enjoy broad support merely because there were developed through collaborative international processes by countries participating voluntarily. Participants in those processes may not perceive lack of a formally specified model as a detriment. This is particularly true if a participating country used a collaborative process in which stakeholders[4] had opportunities to help develop the country's contribution to the dialog. However, if stakeholders were unable to participate in the dialog leading up to the C&I, they may feel disenfranchised, may feel that their perspectives are insufficiently represented in the indicators ultimately selected, and therefore are more likely to be skeptical about the validity and usefulness of the C&I.

Developing a conceptual model or the logic that relates the various C&I to each other can form the basis for engaging stakeholders who were not part of the process and converting their skepticism to support. Discussing the concepts and logic for the C&I can illustrate where the stakeholders and the C&I developers share mutual interests. Shared interests are a powerful way to build support. Lack of a formally described conceptual or logic model deprives C&I supporters of a tool that can help to broaden and deepen support for sustainable forests.

3 The Office of Science and Technology Policy and the Council on Environmental Quality are parts of the Executive Office of the President of the United States of America.

4 A stakeholder is an individual or group that has a share or interest at risk in an activity or enterprise – often a financial share or interest.

A more difficult problem arises if some scientists feel that science was not adequately represented in the collaborative process of developing the C&I. If scientists were not part of the original dialog, they were not exposed to the thinking of participants whose views might have helped to reshape their understanding of the C&I. This includes being unable to reconcile their individual perspectives on sustainability, based on their discipline's relatively narrow descriptions models, with the interactions and tradeoffs inherent in a broad set of C&I.

The debate over lack of a clear conceptual model or scientific framework can distract people from discussing what the indicators mean, limiting their usefulness in the public dialogue on sustainable forests. This is the largest problem created by the lack of a logic model that scientists endorse. Their criticism confuses policy makers and the public regarding the importance and relevance of the indicator information. The result is diminished impact of the C&I reports. If a country is committed to practicing science-based forest management and to using science as the basis for policy decisions, an inability to describe a scientific framework behind the C&I may become a liability for C&I reporting.

3. How would a model promote sustainable forest management?

Pragmatists are probably wondering what developing a model could mean to us now. After all, the sets of C&I are complete. We believe that there are four reasons why a logic model is important for C&I processes, even at this point in time.

- A model will help tell the story about sustainability in C&I reports. People have difficulty understanding the meaning of 40 to 70 indicators. Those who support sustainable forests need to distill the indicator information into a few powerful stories about conditions and trends in forests that the lay public can understand. A model can help develop the stories.
- A model can help guide the future evolution of indicators. Clarifying indicators to make them more useful should only be done in the context of the original logic and concepts that guided the original developers. If the choice is made to move in another direction, that decision will be much clearer if the original logic and concepts were well-documented and the intended revisions to that logic are made clear.
- A model that helps explain the logic behind indicators and their complex inter-relationships will help enhance integration. A model can help improve understanding at both the conceptual level as well as at the implementation and interpretation levels. A model at the conceptual level shows the "big picture" and helps assure interested parties that all the significant elements are covered. A model also helps to assure consistent implementation and interpretation. Consistency from place to place promotes comparability. Consistency through time promotes confidence that the data will correctly reveal change.
- A model can help improve links to other resource, economic, and social sectors. Evaluating the economic contributions of forests in the same way that the economic contributions of the agricultural sector or an industrial sector are evaluated can help investors, managers and policy makers. Sometimes, forest sustainability receives less attention because consistent metrics of productivity or performance for other resource sectors are lacking. Models of activity and responses in the forest sector, particularly where management activities are translated into economic and social benefits, can help put forests on a more equal footing with agriculture or other development activities for investor dollars and policy makers' attention. This will help mitigate or avoid inadvertent impacts of public policies or private investments on forests and the people that depend upon them for their livelihoods.

4. What is the theory of what constitutes a good logic model?

"Logic models" were first described by Wholey (1979). Since the logic model concept was developed in the 1970s, it has been increasingly used in program planning and evaluation in both the public and private sectors, in the U.S.A. and around the world (World Bank 1996, W.K. Kellog Foundation 2004). In simple terms, a logic model communicates the underlying "theory" or sets of assumptions and hypotheses about how something works. Often presented as a diagram, a logic model shows the intended flow of action. A logic model shows how inputs are used to conduct activities that create outputs, which in turn create short– and long-term outcomes that ultimately lead to the impact or end results of the set of events. The desired outcome or goal of a program is often displayed as the end result, the last link in a logical chain of events.

In thinking about logic models, it often helps to begin from the end of the chain – the goal or desired future condition – and work backwards to the activities and inputs that are needed. Consider the following sustainable forests logic model, developed in very simple terms:

- The goal or desired future condition is sustainable forests that meet the expectations outlined in the Bruntland Commission report.
- To achieve the goal of sustainable forests, the short- and long-term outcomes that are needed are sound policies, wise foresters, and proven forest management activities that when skillfully applied lead to sustainable forests.
- To create the sound policies, wise foresters, and proven forest management activities, the outputs needed are science, technology, and education.
- And of course, professors, researchers and money are the inputs to the education, research, and development activities. So in very simple terms, this is sustainable forests logic model.

Notice that we did not mention in this simple sustainable forests logic model the need for criteria and indicators. Let us do that now.

For a logic model to work efficiently and effectively, feedback loops are needed to link the various activities and processes to resource status, conditions, and trends. Consider the point in the logic model where sound policies and wise foresters are being created and proven forest management activities are being applied. Someone needs to be checking to determine if those policies, foresters, and management activities are really leading to sustainable forests as intended. A feedback loop is needed that periodically reports on whether the policies, foresters, and management activities are really working as intended and leading towards the sustainable forests goal.

The C&I are designed to provide this type of feedback. An important point is that the C&I become a surrogate for *what* the goal of "sustainable forests" means – *what* dimensions of the goal are most important for tracking progress. The logic model explains *why* these particular dimensions of the goal of "sustainable forests" were selected for tracking progress. Choosing what without explaining the *why* leaves many readers unfulfilled and inferring or guessing at the logic.

So why does the problem that we discussed at the beginning of the presentation persist? Why do people continue to ask, "Do we have sustainable forests?" and "Are our forests being managed on a sustainable basis?"

We believe the central problem is that the logic models behind sustainable forests are stored in the wrong place – they are stored inside our heads instead of on paper. Inside our heads, neither scientists nor the public can see them, probe them, consider them, and test them for themselves.

On paper and shared with scientists, the public and policy makers, the logic models could go a long way towards demonstrating that collectively, we forest experts have thought long and hard about sustainability, about what sustainable forests look like, what their elements are.

If our rationales for why certain C&I were selected as important for the evaluation of sustainable forests were well-documented in a logic model, we believe this would build trust within the communities of interest for forests, for C&I processes, and ultimately for sustainable forest management and the resources needed to practice it.

5. An example of logic models being developed in the U.S.A.

Within the White House Council on Environmental Quality (CEQ), there is an ongoing dialog among federal agencies about creating the capability to regularly monitor and report on environmental conditions across natural resource sectors. The general logic model guiding those discussions can be displayed as a hierarchical pyramid, Figure 1. At the bottom of the pyramid are the various kinds of inventory and monitoring information collected. This information is used to compute or estimate sets of criteria and indicators used for policy, planning, and resource management purposes, the second tier from the bottom. For the key indicators tier, some of the indicators from the second tier are selected to be highlighted or combined with others into new indicators that are especially important. From these key indicators, fact-based stories are written that describe, in narrative terms, natural resource conditions in ways that are easily understandable to senior officials, stakeholders, and the public. Of course, this relatively simple logic model can be expanded and developed in greater depth to guide technical experts in actually developing the comprehensive statistical system. Similar concepts have been used in a number of indicator projects throughout the world.

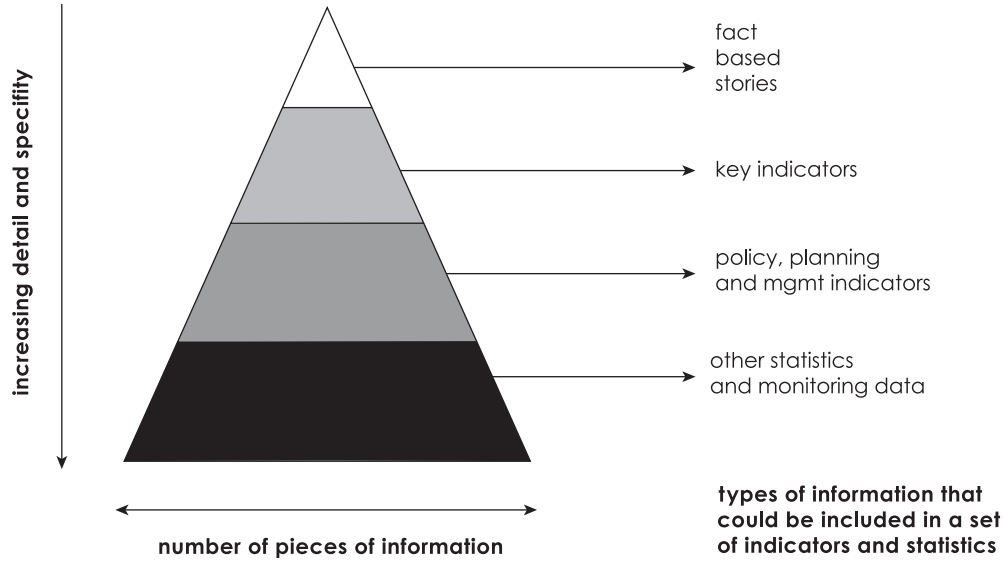

Figure 1. The information piramid.

In the U.S.A., four voluntary collaborative partnerships have emerged over the past 10 years, each focused on the sustainability of a specific natural resource sector – forests, rangelands, water, and minerals. Each partnership has included the word "Roundtable" in their name, to show that each participant has equal standing in the group. The Roundtable on Sustainable Forests adopted the Montreal Process C&I as a useful set for tracking progress towards the goal of sustainable forests. The Sustainable Rangelands Roundtable has developed a set of indicators that is similar to the forest C&I.

Participants in these and other indicator projects joined together to develop a conceptual framework based on systems models within which to place indicators of sustainability for various resource sectors. The objectives of this framework were:

- To serve as a means for identifying and organizing indicators, for verifying the soundness of C&I and for identifying common indicators for different resource systems;
- To facilitate synthesis of measurements and interpretation of data for similar indicators;
- To facilitate integrated interpretation of sets of indicators, and
- To facilitate the use of C&I in undertaking integrated assessments of geographic areas having a mix of resource systems.

The framework is a hierarchically related set of conceptual models that show the elements and logical relationships in the environmental, economic, and social systems that are relevant to the selection, refinement, synthesis, and integrated interpretation of indicators.

The Tier 0 Model

Tier 0 provides the most general description of the relevant systems, as shown in Figure 2. In this view, Earth's ecosystem is the most encompassing system. It includes all living things and the non-living things with which they interact. Earth's ecosystem is divided into human and non-human subsystems. The non-human subsystem is referred to as the environmental subsystem, or simply the environment. The environment includes physical and biological components. Human systems include economic systems in which goods and services are produced, exchanged and used; and social systems which are the institutions and patterns of behavior and interaction among people.

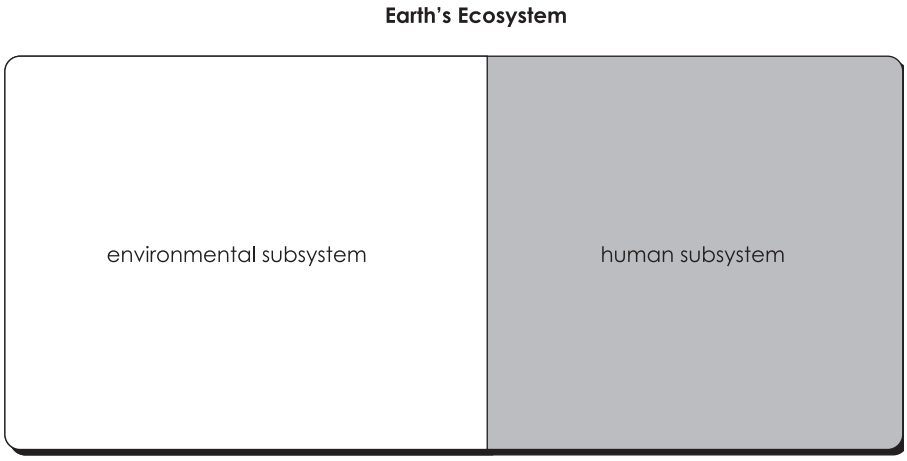

Figure 2. Tier 0 – ISG Conceptual Framework.

The Tier 1 Model

The overall structure of the Tier 1 Model has two dimensions. As shown in Figure 3, the vertical dimension distinguishes between the states or conditions of interest and the processes through which changes in those states occur. The horizontal dimension in Figure 3 distinguishes between the human and environmental elements of the Earth's ecosystem. Within the states of both

subsystems the framework distinguishes between current conditions and the enduring capacities that human's rely upon to satisfy their needs. The enduring capacities are called social capacity, economic capital and natural resource capital. Tier 1 also shows processes that occur within both subsystems and, most importantly, the interactions that occur between them.

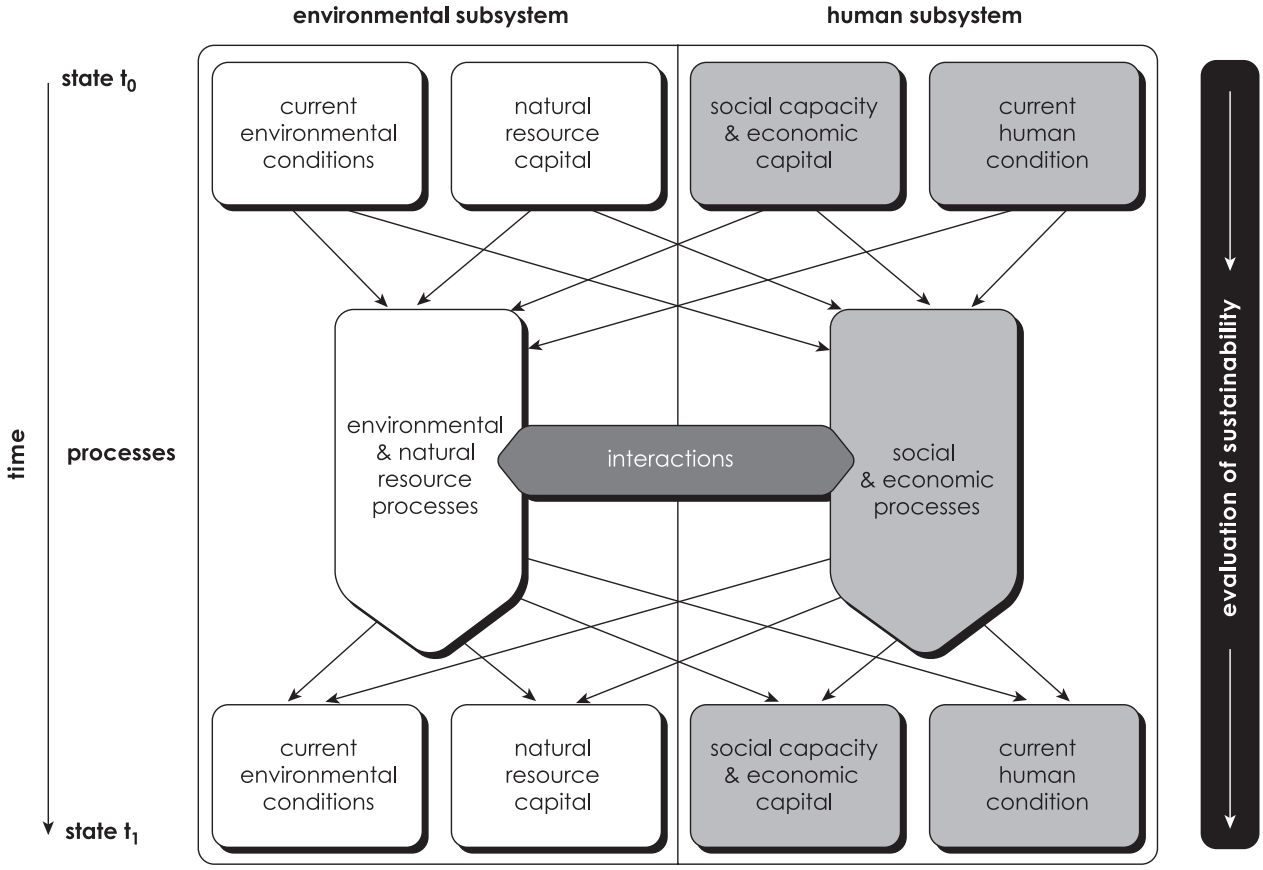

Figure 3. Tier 1 – ISG Conceptual Framework.

This general systems view is consistent with a variety of sustainability concepts. In particular, it includes the economic, environmental and social realms often described as the three legs of the sustainability stool. It recognizes that over the long run, both human conditions and environmental conditions are affected by processes in and among all three.

The states included in the framework include Current Environmental Conditions, Natural Resource Capital, Social Capacity, Economic Capital and Current Human Conditions. This reflects the principle that sustainability can be achieved by maintaining capital, broadly defined. This structure also has the advantage of being consistent with the most widely accepted concept of sustainable development, namely that put forward by the Brundtland Commission in 1987.

The framework uses the term Natural Resource Capital to refer to the stocks and flow capacities in the environment from which humans can extract commodities. The term capital emphasizes the long run economic importance of these capacities. In most cases, the management of natural resources involves investment to locate and develop natural resource capital as well as the natural processes that contribute to its creation and renewal. In the indicator sets identified by the U.S. sustainable resource roundtables, these stocks and flow capacities are measured in biophysical rather than monetary terms.

It is important to be clear about the distinction between Natural Resource Capital and Current Environmental Conditions. One way to clarify the distinction is by analogy to the difference between a measure of the capacity of an automobile engine and the underlying conditions on which it depends. The most direct measure of engine capacity is its power rating, as measured by a dynamometer. Yet automotive engineers know that other parameters such as cylinder volume, bore stroke, and compression ratio affect the power of the engine.

There are similar distinctions between environmental conditions and natural resource capital. For example, sustainable yield might be a good measure of the capacity of a renewable resource system that could be used as an indicator of natural resource capital. Clearly, sustainable yield depends on a number of environmental conditions and processes. In the case of the environment however, such conditions are relevant to a wider range of functions than the capacity to produce natural resources. Whereas one might choose to measure engine power directly or estimate it from a set of parameters on which it depends, in the environmental realm it could make sense to measure both natural resource capital and the environmental conditions that affect it. In fact, the C&I sets being developed for sustainable resource management do just that.

While the term Economic Capital is well defined and accepted, the analogous term Social Capital is less well defined and is somewhat narrower than its economic counterpart, even though it is an important part of the sociological literature. In using the term Social Capacity and Economic Capital, the team is suggesting, in concept at least, that an indicator set for sustainable resource management should include those aspects of social relationships that are enduring, relevant to the management and use of natural and environmental resources, and contribute to satisfaction of human needs and wants through social as well as economic processes.

It is important to emphasize that the human enterprise develops and draws upon combinations of natural resources capital, social capacity and economic capital. These combinations are suggested by the proximity of the two capital components in the Tier 1 model.

The Tier 2 Model

Tier 2 shows a further level of detail for both states and processes, as shown in Figure 4. The Tier 2 framework shows the following categories of Current Environmental Conditions:

- Air, water;
- Plants, animals;
- Rocks, soil;
- Microorganisms.

Conditions in these categories are determined primarily by Underlying Environmental Processes. These Underlying Environmental Processes are the processes through which all living things and the non-living elements of Earth's ecosystem interact in adaptive networks that sustain life. In principle, the Underlying Environmental Processes provide a general but comprehensive description of the workings of the Earth's biological and physical environment, including of course, its ability to sustain Life. The Tier 2 model uses general, science-based labels for such processes. All of the processes through which living things support each other are treated as Underlying Environmental Processes. This is clearly shown by the connection of the vertical arrow for Underlying Environmental Processes to the Final Environmental Conditions, which include, of course, the conditions of all living things.

Some combinations of Underlying Environmental Processes are specifically involved in interactions with human processes in ways that affect conditions in the human subsystem. These are shown in the Tier 2 model by arrows that bend into the horizontal position and point from the environmental subsystem toward the human subsystem.

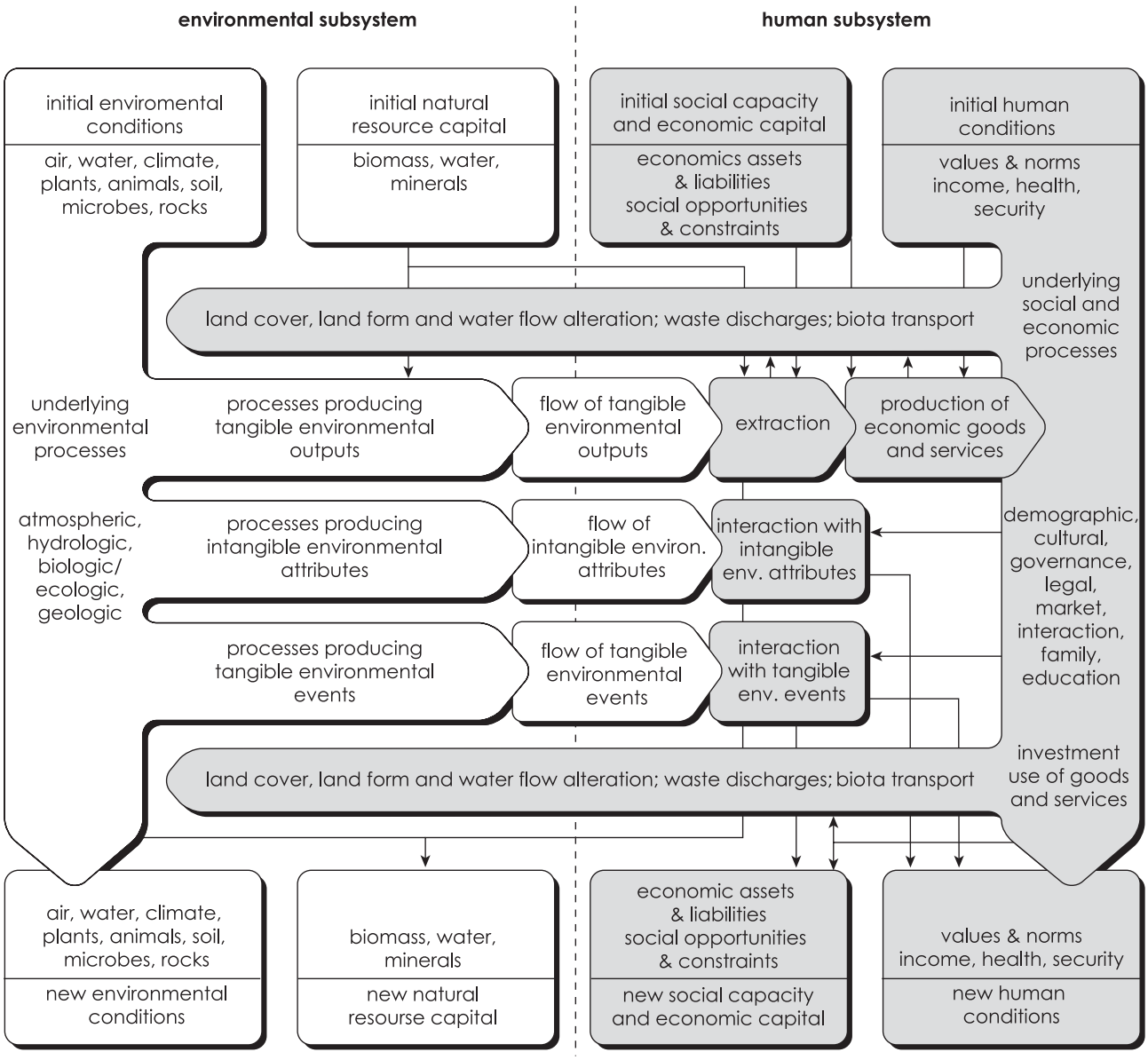

Figure 4. Tier 2 – ISG Conceptual Framework.

The Tier 2 model distinguishes three types of interactions with the human subsystem that result from such combinations of environmental processes:

- Flows of tangible environmental outputs: these are forms of matter and energy that humans extract from the environment and transform into economic goods and services.
- Creation and maintenance of intangible environmental attributes that humans experience: these include environmental conditions or processes from which humans experience aesthetic, spiritual or cultural values.
- Tangible environmental events and processes that humans experience: these environmental processes that humans experience directly or that directly affect human artifacts.

The distinguishing feature of these three types of interactions is that they cross the interface between the environmental and the human subsystems whereas many other environmental processes do not. They are the flows and processes from the environment that directly affect human processes and conditions.

6. Conclusions and Recommendations

We believe that the custodians of C&I processes and developers of C&I need to develop logic models that support the C&I selected. Writing the rationales for selecting indicators and the linkages assumed to exist among indicators provides a clearer picture of the concepts and thinking behind why indicators – individually and as a set – were chosen. There are too many downsides and too many opportunities foregone from not having a model. Effort is warranted now to remedy this situation.

We have provided two examples of conceptual or logic model diagrams from work in the U.S.A. We are confident that many other examples could be cited from literature in other countries. Our examples are not presented as specific proposals to be adopted. Rather, they were selected to illustrate that such models – whether simple or elaborate – can be useful tools, both for thinking about indicators and their relationships and for communicating complex concepts to stakeholders. We have seen evidence that logic models can generate support for existing programs and provide guidance for future activities.

We want sustainable forests to be a reality; if not in our time, then in our children's time. Logic models can help us achieve that goal.

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APPENDICES

Appendix 1. Workshop Agenda

Inter-C&I Process Collaboration Workshop
Bialowieza, Poland, June 8–10, 2006

7 June 2006, Wednesday

17^{30}	Departure by bus from Warsaw International Airport
21^{00}	Arrival at Bialowieza. Registration at the hotel "Soplicowo"
21^{30}	Dinner

8 June 2006, Thursday

5^{00} - 7^{00}	Early morning trip to forest – European Bison tracking (Group1)
7^{30} - 8^{30}	Breakfast
9^{00} - 9^{15}	Opening of the workshop and introductions
	Chairman of all plenary sessions: Christopher Prins, UNECE
9^{15} - 9^{30}	Review of workshop purpose and how we will work

Session 1. Current initiatives, implementation issues and collaboration needs

9^{30} - 9^{50}	ITTO overview
9^{50} - 10^{10}	Montreal Process overview
10^{10} - 10^{30}	MCPFE overview
10^{30} - 10^{50}	FAO/CPF overview
10^{50} - 11^{15}	Coffee Break

Session 2. The need for collaboration among the C&I processes

11^{15} - 11^{45}	Background paper by Ewald Rametsteiner
11^{45} - 12^{30}	Discussion
12^{30} - 13^{45}	Lunch
13^{45} - 14^{30}	Discussion

Session 3. The audiences for national sustainability reports

14^{30} - 15^{00}	Background paper by Jari Parviainen
15^{00} - 15^{30}	Discussion
15^{30} - 16^{00}	Coffee break
16^{00} - 17^{00}	Discussion
18^{00} - 20^{00}	Dinner & Reception

9 June 2006, Friday

5^{00} - 7^{00} Early morning trip to forest – European Bison tracking (Group2)

7^{30} - 8^{30} Breakfast

Session 4. General model for C&I

9^{00} - 9^{30} Background paper by Richard Guldin / Ted Heintz

9^{30} - 10^{45} Discussion

10^{45} - 11^{15} Coffee break

11^{15} - 12^{30} Breakout groups to address:

Breakout group A: Future C&I processes collaboration goals

Breakout group B: Areas of coordination/harmonization – future workshop agenda items

Breakout group C: How to generating political commitment for future workshops, financing and workshop frequency

12^{30} - 13^{45} Lunch

13^{45} - 15^{30} Continued breakout groups

15^{30} - 16^{00} Coffee break

16^{00} - 17^{00} Presentation of conclusions and comment

17^{00} - 18^{30} Short rest-time in hotel

18^{30} - 22^{00} Dinner in the forest

10 June 2006, Saturday

5^{00} - 7^{00} Early morning trip to forest – European Bison tracking (Group3)

7^{30} - 8^{30} Breakfast

8^{30} Depart hotel

9^{00} - 12^{00} Visit to Bialowieza National Park – trip to the Strict Reserve (guided by National Park Service)

12^{00} - 13^{00} Lunch

13^{00} - 16^{00} Visit to Forest District Hajnowka – tour in the protected managed forests, visit to the Bison Reserve (guided by Forest Service)

17^{00} Departure to Warsaw

21^{30} Arrival to hotel in Warsaw

Appendix 2. List of Participants

MINISTERIAL CONFERENCE ON THE PROTECTION OF FORESTS IN EUROPE

AUSTRIA

Dr. Georg RAPPOLD
Forest Policy Officer

Ministry of Agriculture, Forestry,
Environment and Water Management

Marxergasse 2, A-1030 Vienna
Austria
tel.: +43 6 642 645 017
e-mail: georg.rappold@lebensministerium.at

FINLAND (also invited expert)

Prof. Jari PARVIAINEN
Director, Joensuu Research Unit

Finnish Forest Research Institute

P.O. Box 68
FIN 80101 Joensuu
Finland
tel.: +358 50391 3010 (mobile)
tel.: +358 10211 3010
fax: +358 10211 3113
e-mail: jari.parviainen@metla.fi

GERMANY

Prof. Michael KÖHL

Federal Research Centre for Forestry and
Forest Products – Institute for World
Forestry

Leuschnerstr. 91
D-21031 Hamburg
Germany
tel.: +49 40 73 962 100
fax: +49 40 73 962 199
e-mail: koehl@holz.uni-hamburg
weltforst@holz.uni-hamburg.de

NORWAY

Dr. Stein Michael TOMTER
Research Officer

Norwegian Institute of Land Inventory
(NIJOS)

P.O. Box 115
N-1431 Aas
Norway
tel.: +47 64 94 97 71
fax: +47 64 94 97 86
e-mail: stein.tomter@nijos.no

SPAIN

Dr. José María SOLANO LÓPEZ
Head of Forest Planning and Managing Area

Directorate-General for Biodiversity
Ministry of Environment

Gran Vía De San Francisco 4
E-28005 Madrid
Spain
tel.: +34 91 596 4913
fax: +34 91 596 4877
e-mail: jmsolano@mma.es
http://www.mma.es

LIAISON UNIT WARSAW

Mr. Piotr BORKOWSKI
Head of the Liaison Unit Warsaw

MCPFE Liaison Unit Warsaw
ul. Bitwy Warszawskiej 1920 r. nr 3
00-973 Warsaw
Poland
tel.: +48 22 331 70 31
fax: +48 22 331 70 32
e-mail: p.borkowski@lu-warsaw.pl

MONTREAL PROCESS

AUSTRALIA

Ms. Claire HOWELL
Senior Research Scientist
Sustainable Forest Management

Australian Government Bureau of Rural Sciences

Edmund Barton Building
GPO Box 858, 2601 Barton, Canberra
Australia
tel.: +61 262 724 108
fax: +61 262 723 882
e-mail: claire.howell@brs.gov.au

CANADA

Dr. John HALL
Science Advisor, Criteria & Indicators

Natural Resources Canada

580 Booth Street, 12th Floor
Sir William Building
K1A 0E4 Ottawa, Ontario
Canada
tel.: +1 613 947 0646
fax: +1 613 947 9035
e-mail: jhall@nrcan.gc.ca

JAPAN

Mr. Hiroki MIYAZONO
Deputy Director
International Forestry Cooperation Office

Forestry Agency of Japan

1-2-1 Kasumigaseki, Chiyoda-ku
100-8952 Tokyo,
Japan
tel.: +81 3 3591 8449
fax: +81 3 3593 9565
e-mail: hiroki_miyazono@nm.maff.go.jp

NEW ZELAND

Ms. Maureen O'MEEGHAN
Deputy Head of Mission

New Zeland Embassy

Al. Ujazdowskie 51, 00-536 Warsaw
Poland
e-mail: maureen.omeeghan@mfat.govt.nz

RUSSIAN FEDERATION (also MCPFE)

Mr. Vladimir KOROTKOV
Leading researcher
International Center for Forests

All-Russian Research Institute of Silviculture and Forestry Mechanization

Volzhskiy bulvar, Kvartal 95, Korpus 2,
Office 1105, 109125 Moscow
Russia
tel./fax: +7 495 709 46 60
e-mail: vladimir.korotkov@mtu-net.ru
korotkovv@list.ru

URUGUAY

Ing. Daniel SAN ROMAN
Director of Planning Department

Forest Direction

Cerrito 318, Montevideo,Uruguay
tel.: +598 2 915 19 00
e-mail: dsanroman@mgap.gub.uy

UNITED STATES

Mr. Brad SMITH
USDA Forest Service

SPPII

1601 N. Kent Street 4th Floor,
RPC 400 Arlington, Virginia 22209
United States
tel.: +1 703 605 4190
fax: +1 703 605 5131
e-mail: bsmith12@fs.fed.us

INTERNATIONAL TROPICAL TIMBER ORGANIZATION

THE PEOPLE'S REPUBLIC OF CHINA (also MP)

Dr. Wushe CUI
Division Chief

The Department of Forests Resources Management of State Forestry Administration

No. 18 Hepingli East Street
Beijing 100714
The People's Republic of China
tel.: +86 10 84 238 408
fax: +86 10 84 238 683
e-mail: c.wushe@263.net

GHANA

Dr. Victor AGYEMAN
SNR Research Scientist

Forestry Research Institute of Ghana (FORIG)

P.O. Box 63, KNUST, Kumasi
Ghana
tel.: +233 51 60121
e-mail: vagyeman@forig.org

MEXICO (also MP)

Mr. Luis CASAS
Manager, Planning and Evaluation

National Forest Commision – Mexico

Periferico Poniente 5360
45019 Zapopan
Mexico
tel.: +52 333 777 70 73
e-mail: lcasas@conafor.gob.mx

THE PHILIPPINES

Mr. Marcial C. AMARO Jr.
Director
Forest Management Bureau

Department of Environment and Natural Resources

Visayas Avenue, Diliman
Quezon City 1100
The Philippines
tel.: +63 2 927 4788; +63 2 928 9313
fax: +63 2 920 0374
e-mail: amaromarsjr@yahoo.com
fmbdenr@mozcom.com

ATO/ITTO

Dr. Richard EBA'A ATYI
Regional Coordinator ATO/ITTO Project on PCI

International Tropical Timber Organization
c/o African Timber Organization (ATO)

B.P. 1077 Libreville
Gabon
tel: +241 44 58 99
tel.: +241 07 52 92 54
fax: +241 44 54 60
e-mail: richard_ebaa@yahoo.fr

ITTO

Dr. Steve JOHNSON

ITTO

1-1-1 Minato-Mirai Nishi-ku
220-0012 Yokohama
Japan
tel.: +81 45 223 1110
e-mail: johnson@itto.or.jp

INTERNATIONAL ORGANIZATIONS

UNECE

Mr. Christopher F.L. PRINS
Chief
Timber Branch

UN Economic Commission for Europe/Food and Agriculture Organization

UNECE Trade Development and Timber Division, Palais des Nations
CH 1211 Geneva 10
Switzerland
tel.: +41 22 917 2874
fax: +41 22 917 0041
e-mail: christopher.prins@unece.org

Mr. Alexander V. KOROTKOV
Forest Resources Assessment
UNECE/FAO Timber Section

UN Economic Commission for Europe

Palais des Nations, Office 458
CH-1211 Geneva 10
Switzerland
tel.: +41 22 917 28 79
e-mail: alexander.korotkov@unece.org

FAO

Ms. Tiina VÄHÄNEN
Forestry Department

Food and Agriculture Organization of the United Nations

Viale delle Terme di Caracalla (D-452)
00100 Rome
Italy
tel.: +39 06 5705 3743
fax: +39 06 5705 2151
e-mail: tiina.vahanen@fao.org

UNFF

Mr. Jorge ILLUECA
Principal Forest and Environment Policy Officer

Secretariat of the United Nations Forum on Forest (UNFF)

One UN Plaza
DC 1-1254, New York, NY 10017
United States
tel.: +1 917 367 3436
fax: +1 917 367 3186
e-mail: illueca@un.org

OTHER C&I PROCESSES

CAMBODIA (also ITTO)

Mr. Khorn SARET
Chief of Forestry Management Office
Forestry Administration

Ministry of Agriculture, Forestry and Fishery

40 Preah Norodom Blvd, Sangkat Phsar
Kandal 2
Khan Doun Penh
Phnom Penh
Cambodia
tel.: +855 23 212 201
e-mail: ksr_nang2006@yahoo.com

DRY-ZONE AFRICA/CILSS

Mr. Francois TAPSOBA

01BP 6248 Ouagadougou
Burkina Faso
tel.: +226 36 55 03
mobile: +226 70 26 23 91
fax: +226 50 37 57 30
e-mail: francois_tapsoba@yahoo.fr

LEPATERIQUE PROCESS

Mr. Miguel MENDIETA DURON
Forest Adviser

Agenda Forestal Hondurena

Colonia Palmira
Frente Parque Buento Juarez
Tegucigalpa
Honduras
tel.: +504 238 1342
e-mail: mrmendieta@yahoo.com.mx

CENTRAL ASIA SUB-REGIONAL COUNTRIES

Ms. Venera SURAPPAEVA
Head of Department for Forest Management Planning

Forest and Hunting Inventory of the State Agency on Environment Protection and Forestry of Kyrgyz Republic

3, L. Tolstoj str.
720005 Bishkek
Kyrgyz Republic
tel.: +996 312 543910
fax: +996 312 543933
e-mail: surappaeva@hotbox.ru

INVITED EXPERTS

Dr. Richard W. GULDIN
Director, Policy & Quantitative Sciences

USDA Forest Service

1601 North Kent Street, 4th Floor
Rosslyn,Virginia, 22209
United States
tel.: +1 703 605 4177
fax: +1 703 605 5131
e-mail: rguldin@fs.fed.us

Mr. Theodore HEINTZ
Indicator Coordinator

White House Council on Environmental Quality

722 Jackson Place NW
20503 Washington, DC
United States
tel.: +1 202 456 6541
e-mail: theodore_heintz@ceq.eop.gov

Dr. Ewald RAMETSTEINER

BOKU University and IIASA

Feistmantelstr. 4
A-1180 Vienna
Austria
tel.: +43 1 476 54 4413
e-mail: ewald.rametsteiner@boku.ac.at

WORKSHOP SECRETARIAT

Mr. Robert L. HENDRICKS
Senior Policy Analyst

USDA Forest Service

12000 Lisa Marie Ct
22033 Fairfax
United States
tel.: +1 202 272 4730 / 272 4750
e-mail: rhendricks@fs.fed.us

Ms. Małgorzata BUSZKO-BRIGGS

Ministerial Conference on the Protection of Forests in Europe
Liaison Unit Warsaw

ul. Bitwy Warszawskiej 1920 r. nr 3
00-973 Warsaw
Poland
tel.: +48 22 331 70 31
fax: +48 22 331 70 32
e-mail: m.buszko-briggs@lu-warsaw.pl

Ms. Lei CHEN
University of Tuscia
Faculty of Agriculture
Via S. Camillo De Lellis 01100 Viterbo
Italy
tel.: +39 33 346 593 89
e-mail: lellec@163.com
rinoa1982@libero.it

Dr. Roman MICHALAK

Ministerial Conference on the Protection of Forests in Europe
Liaison Unit Warsaw

ul. Bitwy Warszawskiej 1920r. nr 3
00-973 Warsaw
Poland
tel.: +48 22 331 70 31
fax: +48 22 331 70 32
e-mail: r.michalak@lu-warsaw.pl

Mr. Tomasz JUSZCZAK

Ministerial Conference on the Protection of Forests in Europe
Liaison Unit Warsaw

ul. Bitwy Warszawskiej 1920 r. nr 3
00-973 Warsaw
Poland
tel.: +48 22 331 70 31
fax: +48 22 331 70 32
e-mail: t.juszczak@lu-warsaw.pl

Appendix 3. Sample of international calls for more collaboration among C&I processes

Expert Consultation on Criteria and Indicators for Sustainable Forest Management
Cebu City, Philippines, March 22-24, 2004

Observation

- *National and international expert groups related to C&I, such as technical advisory groups and focal points, could play a key role in enhancing communication, information management and networking.*

Recommendations

- *The CPF and its members, C&I processes and countries should establish mechanisms for exchange of information, ensuring that all stakeholders are aware of developments, reducing ambiguities. In doing so, use should be made of existing organizations and mechanisms to the extent possible.*
- *C&I processes are encouraged to hold collaborative meetings to address technical issues related to terms and definitions. Initiatives should be taken by active processes.*

UN Forum on Forests 4

Encourages member States, regional and sub-regional organizations and existing criteria and indicators processes to strengthen and facilitate regional and sub-regional cooperation, as appropriate, on monitoring, assessment and reporting, by sharing experience and know-how through such means as joint meetings and workshops, making publications available in other languages, electronic communication and the development of web sites.