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Using criteria and indicators for sustainable forest management

A way to strengthen results-based management of national forest programmes

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Acronyms and abbreviations

ASEAN	Association of South East Asian Nations
ATO	African Timber Organization
C&I	criteria and indicators
CBD	Convention on Biological Diversity
CIFOR	Center for International Forestry Research
CIP	Country Investment Plan (Bangladesh)
COMIFAC	Central African Forests Commission
FDF	Federal Department of Forestry (Nigeria)
FLEGT	Forest Law Enforcement, Governance and Trade
FRA	Global Forest Resources Assessment
FSC	Forest Stewardship Council
GDP	gross domestic product
IPF	Intergovernmental Panel on Forests
ITTO	International Tropical Timber Organization
IUCN	International Union of Conservation of Nature
MAR	monitoring, assessment and reporting
M&E	monitoring and evaluation
MEL	monitoring, evaluation and learning
MoV	means of verification
MPWG	Montréal Process Working Group on the Conservation and Sustainable Management of Temperate and Boreal Forests
MRV	measuring, reporting and verification
NBSAP	National Biodiversity Strategy and Action Plan
NFI	National Forest Inventory
NFM	national forest monitoring
NFP	national forest programme
NGO	non-governmental organization
NOA	National Orientation Agency (Nigeria)
OECD	Organisation for Economic Co-operation and Development
OTCA	Amazon Cooperation Treaty Organization
PEFC	Programme for the Endorsement of Forest Certification
RBM	results-based management
REDD+	Reducing Emissions from Deforestation and Forest Degradation, including the role of conservation, sustainable management of forests and enhancement of forest carbon stocks
RSF	Roundtable on Sustainable Forests
SDG	Sustainable Development Goal
SFM	sustainable forest management
SFR	Sustainable Forests Roundtable (United States of America)
SMART	specific, measurable, achievable, relevant and time bound
TM	Thematic Mapper
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Programme
UNFCCC	United Nations Convention on Climate Change
UNFF	United Nations Forum on Forests

Summary

Criteria and indicators (C&I) have emerged as a powerful tool in promoting sustainable forest management (SFM). Since the United Nations Conference on Environment and Development (UNCED) in 1992, several different international processes and initiatives have developed C&I as a framework for SFM. Use of C&I can provide structure and facilitate a common understanding of SFM at the national level. In addition, C&I can help to promote agreement on key issues, create a link to required data and resources, serve as a reference framework for policy design, planning and programming, and facilitate the monitoring of results.

Also developed in the follow-up to UNCED, national forest programmes (NFPs) are a generic concept encompassing a wide range of approaches to SFM, which are applicable to all countries and all types of forests. Integrating C&I into NFPs provides a solid basis for enhancing results-based management (RBM) in the forest sector, since an RBM approach to designing and implementing an NFP requires that results be identified, prioritized and measured – and that is exactly the function of C&I. The recent adoption of the Sustainable Development Goals (SDGs) presents an opportunity to strengthen the combined use of C&I and NFPs to promote sustainability in the post-2015 development agenda.

This practical publication aims to promote the use of C&I to strengthen RBM in forest policy design, planning and monitoring, ultimately to improve SFM. Based on highly consultative processes around the world and with more than 30 practical examples, this document discusses how to improve the use of C&I and integrate them in NFPs and other frameworks for SFM.

It offers nine important points to consider at different stages of the RBM cycle:

A. Strategic planning stage

- A1: Integrating C&I into NFPs can strengthen SFM.
- A2: A participatory approach in selecting C&I is important to build broad ownership.
- A3: C&I must be part of a monitoring and evaluation (M&E) system with adequate funding.

B. Operational planning stage

- B1: C&I should be adapted to national/subnational contexts and needs, considering existing C&I sets and data availability.
- B2: A minimal number of vital indicators should be developed at each level in the results chain.
- B3: Results-oriented budgeting can encourage a focus on performance and ensure that resources are adequately allocated to achieve desired outputs.

C. Monitoring, evaluation and learning (MEL) stage

- C1: C&I are only as good as their data collection and management systems.
- C2: Using C&I for monitoring and reporting in a strategic way can enhance evidence-based decision-making during implementation.
- C3: Learning from evidence that C&I generates can lead to improved future programming and policy.

This guide also discusses a number of ways to strengthen the use of C&I for SFM, including among others the simplification and harmonization of C&I, the promotion of a cross-sectoral and landscape approach, and capacity development and feedback loops. Finally, it proposes steps for further developing and adapting existing C&I as well as for enhancing their use.

1. Introduction

Background

Over the past few decades, multilateral development institutions, governments and other international development actors have shown a growing interest in demonstrating results. At the Rio+20 Summit in June 2012, countries agreed to create a set of universal and integrated Sustainable Development Goals (SDGs). Following their adoption by the UN in 2015, it is expected that these high-level goals will stimulate action in support of the three dimensions of sustainable development – economic, social and environmental – over the next 15 years (UN, 2015a). The SDGs emphasizes the importance of going beyond inputs and activities, to track and analyse results.

Forests and forest resources provide livelihoods for more than a billion people (FAO, 2015a), and forest-related services and benefits are multifaceted and wide-ranging. Forests thus have a crucial role in meeting a number of the SDGs (Box 1). However, forest biodiversity is increasingly threatened as a result of deforestation, fragmentation, climate change and other stressors. There is therefore an evident need for systems that foster sustainable forest management (SFM) and embrace the broad array of values and interests of different stakeholders vis-à-vis forests.

The United Nations (UN) General Assembly defined SFM as a "dynamic and evolving concept [that] aims to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations" (UN, 2008a). In order to make progress in SFM, there is a growing need for active public involvement in forestry decision-making as well as for streamlined, systematic and more results-oriented approaches to measuring and reporting on progress and results in SFM.

Results-based management (RBM) – a management strategy that promotes efficient and effective performance – provides a model for doing just that. It can facilitate SFM by providing frameworks and tools for defining realistic expected results, assessing risk, monitoring progress, reporting on performance and integrating lessons learned into management decisions related to forest governance.

Criteria and indicators (C&I) are potentially powerful RBM instruments for promoting and demonstrating progress towards sustainability as well as for ensuring a common understanding of the wide range of social, ecological and economic elements that collectively capture the range of values that forests have and provide (FAO, 2015b). Criteria help to define the desired results of particular programme or project in an understandable and communicable way – whether they be immediate results (outputs), medium-term results (outcomes) or long-term results (impact). Performance indicators enable those results to be measured, analysed and reported in a consistent and verifiable manner. A number of sets of C&I have already been developed around the world to evaluate progress towards SFM at different levels (Annex 1), and many countries produce national reports that assess this progress.

Box 1. Forest-related Sustainable Development Goals (SDGs)

SDG 15, "Life on land", is the goal that is most pertinent to the forestry sector. It aims to "protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss". SFM is an important strategy for achieving this goal.

Because of the multifunctionality of forests, SFM also contributes to basic securities such food, water, energy and health, thus contributing to improved livelihood conditions. Given the many linkages between forests and other sectors, SFM is key to sustainable development in general. Therefore, its relevance to the SDGs clearly goes far beyond SDG 15, extending to others such as SDG 1, "No poverty"; SDG 2, "Zero hunger"; SDG 8, "Decent work and economic growth"; SDG 12, "Responsible consumption and production"; and SDG 13 "Climate action".

Source: UN (2015b, 2016a).

Fundamental to successful RBM is the use of results frameworks – such as the logical framework approach – to guide programme design and planning as well as monitoring and evaluation. Results frameworks containing C&I can help to organize and transmit existing information, identify gaps in knowledge and structure the gathering of new information to feed back into forest management and policy-making. An essential element of any results framework is the "theory of change", which articulates the clear cause-and-effect relationships between different levels of the results chain, from activities to outputs, outcome and eventually impact.

The national forest programme (NFP) is the first commonly agreed framework in pursuit of SFM that is applicable to all countries and to all types of forests. The generic term NFP refers to a wide range of approaches towards SFM based on a common set of guiding principles. These principles can be organized in three main clusters (FAO and National Forest Programme Facility, 2006):

- national sovereignty and country leadership;
- consistency within and integration beyond the forest sector;
- participation and partnership.

Integrating C&I into NFPs can provide a solid basis for applying RBM approaches to SFM at the country level, where SFM implementation actually starts to happen. Numerous countries have experience in incorporating C&I into NFPs to track and report on NFP implementation and results, as well as to monitor and evaluate NFPs. C&I are also being used to structure and stipulate processes for agreeing on common goals and development programmes and to help shape policies at the national level (EFI, 2013).

At the global level, the adoption of the SDGs and the more recent Paris Agreement (UNFCCC, 2015) reflect how the world is moving towards more "results-based" governance. C&I can help to demonstrate the contribution of forests towards these goals and countries' progress in this regard. Similarly, the inclusion of SDG indicators in the results frameworks of NFPs can facilitate countries' tracking of their progress in meeting the commitments of the 2030 Agenda for Sustainable Development. As such, these global frameworks enhance the potential for the use of C&I and NFPs – both of which are already well known to the forestry community –to improve results-based SFM.

Purpose and content

The case studies and examples presented in this publication were gathered and synthesized by the project "Strengthening C&I for SFM and Their Use in Forest Policy and Practice" (2014–2016) (FAO, 2015c). After extensive worldwide consultations, an agreed vision to strengthen the use of C&I was developed during the XIV World Forestry Congress in 2015 (FAO, 2015d) (Annex 3). One of the actions suggested was to provide broad access to experiences and lessons learned in using C&I for SFM, and that led to the creation of the present publication.

The purpose of this publication is to provide forest administrations at national and subnational levels with practical examples and tips regarding the use of C&I for SFM, based on a results-oriented approach. It is hoped that this information will help in introducing and/or strengthening results-based multi-year programming, planning and related monitoring at national and subnational levels.

The publication is addressed to all those interested in using C&I to promote SFM in the forest sector, although it is particularly geared towards the national and subnational authorities responsible for the design and planning of NFPs as well as for implementation, monitoring and evaluation (M&E) and reporting of progress towards SFM. Other actors in the forest sector – including international and national non-governmental organizations (NGOs), forest managers and parties responsible for achieving SFM-related results, as well as the private sector – may also find the publication useful.

2. Overview of how C&I can strengthen RBM in NFPs

Introduction to results-based management

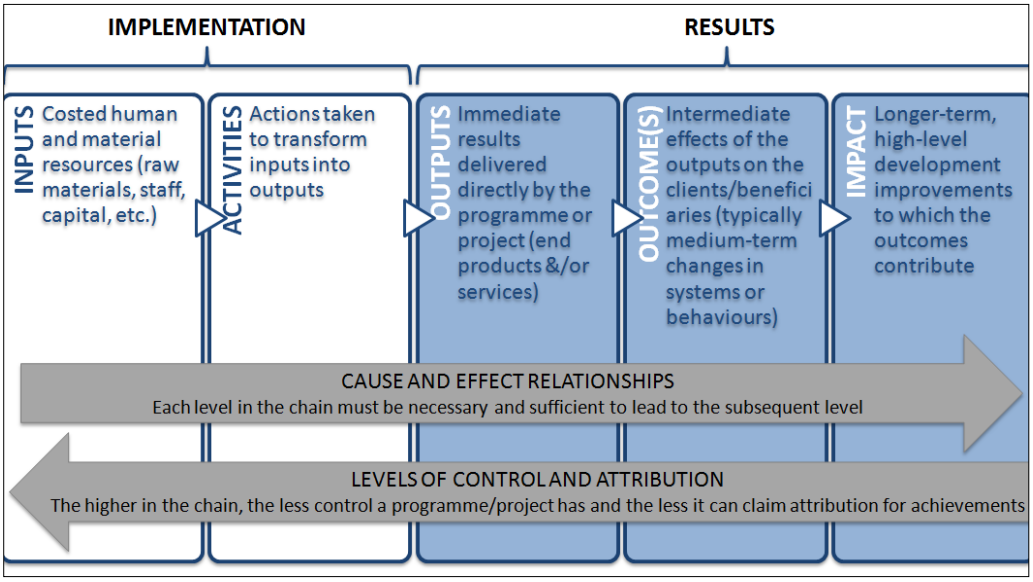
In order to address priority needs, stakeholders must have a clear and commonly established vision of the direction in which they want to head and of the changes that they want to bring about. They must also be able to respond to challenges and opportunities in an appropriate, rapid, efficient and cost-effective manner. RBM is a management strategy focusing on efficiency and effective achievement of results, featuring principles of ownership, inclusiveness, stakeholder engagement and accountability. It consists of set of approaches and tools that can enable more effective planning, management, monitoring, and learning.

RBM is above all characterized by a focus on results over inputs and activities. This is not to suggest that activities are not important; it simply means that the desired changes – i.e. the intended results – should always be kept in sight during the design, implementation, monitoring and evaluation of any intervention. While the exact terminology used by different institutions may differ, it is generally agreed that "results" are the outputs, outcome(s) and impact that a programme, project or policy aims to bring about. Impact represents the ultimate, longer-term goal; outcomes are the medium-term objectives; and outputs can be considered the shorter-term deliverables or intermediate changes resulting from the activities.

Fundamental to the concept of RBM – and to M&E in general – is the results chain, which articulates the theory of change or logic model on which the programme is based. Each level in the results chain (from inputs to impact) should have a clear, plausible and logical cause-and-effect relationship with both the preceding and succeeding levels (Figure 1). The basic logic (Flint, 2003) is that:

- the implementation of planned activities leads to delivery of a set of outputs;
- together, the expected outputs result in the attainment of the intended outcome;
- the achievement of the intended outcome contributes to the desired impact.

Figure 1. Results chain

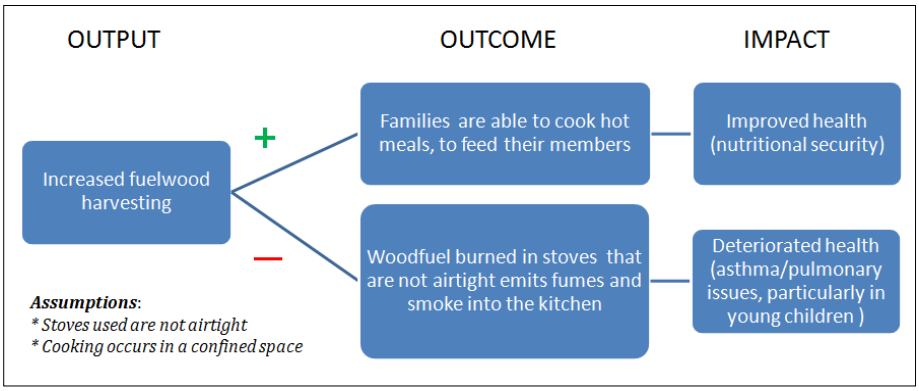


Source: Adapted from UNDP (2009); UNDG (2011).

Of course, in order for such causal effects to occur, certain external conditions must hold true. The assumptions inherent in the logical relationships should be specified in the results framework or log frame. Understanding the relationships, such as how outcomes are created by outputs, is important for the design of effective programmes, the use of appropriate C&I and the interpretation of the

information they generate. The first step is to identify the positive (and potentially negative) changes that are brought about at each level in the results chain. The next step in is to articulate and document the underlying assumptions essential for that logic model to be valid (Figure 2).

Figure 2. Example of the logic model by which an output creates outcomes, both positive and negative



In addition to the notion of causality and related assumptions, the other key concept reflected in the results chain (Figure 1) is attribution. The idea is that the higher in the results chain, the less control the programme or project has and the less it can claim attribution for having directly brought about the observed changes. In this regard, it is generally recognized that a programme or project can only contribute to the desired impact, and that attaining high-level development goals requires partnerships and the combined efforts of multiple programmes and projects.

While the exact terminology used differs by organization and country, generally speaking:

- impact is reflected in a programme's overall goal or general objective;
- outcome is captured in a programme's purpose or specific objective;
- outputs are sometimes referred to as expected results or deliverables.

The concept of logic modelling involves a recursive approach – beginning at the end (impact) and working backwards (to activities). The following questions are asked, in this order:

1. What is the ultimate goal, i.e. desired impact, that we want to achieve through this programme?
2. What are the objectives, i.e. intended outcomes, that will contribute to that impact?
3. What specific deliverables or programme outputs are necessary to bring about the outcomes?
4. What activities must be conducted in order to deliver the expected outputs?
5. What human and financial resources, i.e. inputs, are needed to implement the planned activities?

The recursive thinking that goes into logic modelling may identify critical missing pieces or gaps that are essential to securing the outcomes and impact desired. In this situation, the concern is less about attribution and more about clearly describing the output needed – and the management activities and resources needed to produce the output – to fill a critical gap. Experience has shown that the logic modelling approach encourages deeper thinking about causes and effects, so that RBM becomes a more holistic exercise.

In practical terms, RBM requires that design, planning and implementation be geared towards clearly describing the desirable impacts and outcomes sought and tracking progress towards them, in the form of outputs – the results – not just towards ensuring that all activities are implemented as planned. While the inputs and activities of each institution or department are important, they must always be seen as being in support of national efforts to improve the country's situation and to bring about positive changes to people's lives.

Understanding and applying these concepts is critical for developing, managing and monitoring results-oriented programmes. Ensuring that a programme is designed on the basis of a strong results chain will help to ensure that it effectively addresses the problem that it was designed to address.

C&I as an RBM tool

The wider forestry community has often struggled to define "sustainability" in the context of SFM. To address this, C&I offer a framework for characterizing the essential components of SFM and recognizing forests as ecosystems that provide a wide range of environmental, economic and social benefits to society.

As instruments of choice for applying RBM principles and approaches to programming and policy work in the forest sector, criteria and indicators (see Box 2 for definitions) have the potential to strengthen RBM and, in turn, to improve SFM. C&I are among the most essential tools for applying RBM. They have a broad field of application, ranging from facilitating agreement on common definitions used in communication and debate, to providing a framework for programme design and implementation, to strengthening provision of information and reporting, to clarifying assumptions about the results chain, to enabling the capture of evidence and information on issues and benefits to society. They do this by defining the set of prioritized results that a given programme or project seeks to bring about and by providing a credible, reliable way to measure and report on those results over time. C&I thus promote SFM practices while taking into consideration the social, economic and environmental needs of different stakeholders. C&I are useful in many contexts and at different levels.

Box 2. Definitions of criteria and indicators for sustainable forest management

Criteria define and characterize the essential elements or conditions against which SFM should be assessed, with due consideration to the productive, protective and social roles of forests and forest ecosystems. Each criterion relates to a key element of sustainability and may be described by one or more indicators. Criteria represent core values or management goals/objectives set forth in an NFP or other initiative. A single criterion may be associated with multiple programme goals/objectives or vice versa.

Indicators are variables or parameters that enable the measurement of a particular dimension of a criterion. They help monitor the status and changes of forests in quantitative, qualitative and/or descriptive terms that reflect important attributes or dimensions of the criterion, as seen by those who defined each criterion. Indicators that are tracked and reported on over time can reveal trends with respect to the achievement of the core value represented by each criterion.

For example, the first criterion of the Montréal Process Working Group on the Conservation and Sustainable Management of Temperate and Boreal Forests (MPWG), "Conserve biological diversity", expresses a core value or desired result of the participating countries. The three subareas – ecological diversity, species diversity and genetic diversity – each have three indicators that measure dimensions of the core value. The desired changes will most often be defined in terms of "moving the needle" in one direction or the other in one or more of these nine indicators.

***Source*:** FAO (2015b).

Types and examples of C&I

Seven common thematic areas (or criteria) of SFM have emerged based on the criteria of the nine ongoing regional and international C&I initiatives (EFI, n.d.). They were acknowledged by the international forest community in the United Nations Forum on Forests (UNFF) and were adopted in 2007 by the UN General Assembly in the Non-Legally Binding Instrument on All Types of Forests (UN, 2008a). These thematic areas (or criteria) are:

1. Extent of forest resources;
2. Biological diversity;
3. Forest health and vitality;
4. Productive functions of forest resources;
5. Protective functions of forest resources;
6. Socio-economic functions;
7. Legal, policy and institutional framework.

FAO's Global Forest Resources Assessment (FRA) has since 2005 used these thematic areas as a basis for collecting and analysing information from countries to assess progress towards SFM. A further collaboration between FRA, Forest Europe, the International Tropical Timber Organization (ITTO) and the Montréal Process Working Group (MPWG) led to a consolidated and consistent reporting format through the Collaborative Forest Resources Questionnaire (FAO, 2015e), using a common set of core indicators.

A combination of different types of indicators (i.e. quantitative, qualitative and/or binary) can be used to measure the status and changes of each defined criterion (Table 1). Indeed, indicators need not only be numerical; they just have to be measurable (as in "specific, measurable, achievable, relevant and time bound", i.e. SMART). Further, consideration should be given to include some indicators that assess the quality of the information behind the indicators. For example, MPWG uses indicator 7.5.c, "Monitoring, assessment, and reporting on progress towards sustainable forest management" as a meta-indicator. The information reported for individual indicators includes how recently the latest information was collected; whether inventory and monitoring information is routinely updated; whether the monitoring programme has a peer-reviewed statistical sampling design; and the areal sampling intensity.

Progress can be measured to different degrees, depending on the type of indicators selected. For example, in some tropical areas, it is difficult to quantify the results achieved in numerical terms, so it might be better to identify and agree on the direction of change ("more of this"/"less of that") for a given period, using qualitative or descriptive indicators. In other areas, it might be more appropriate to set estimative targets for which progress could be quantified numerically. If this approach is used, the results will have more credibility if the public participates in identifying the indicators and setting the soft targets.

The different kinds and levels of indicators will require different measurement methods (e.g. monitoring, mapping, review or assessment, evaluation or studies), which all have different implications in terms of cost and effort.

Table 1. Examples of different types of SFM-related indicators

Indicator types	Social	Ecological	Economic
Quantitative (change measured in numerical terms)	Number of employees in the forest sector Number of occupational accidents in the forest per year	Number of threatened species Area of forest cover with protected status, by International Union of Conservation of Nature (IUCN) categories, in hectares	Share (% contribution) of the forest sector to gross domestic product (GDP)
Qualitative (change measured in descriptive or semi-quantitative terms)	Public perception of forest management Level of importance of forests to the general population	Political framework and instruments for climate change adaptation of forests Geospacial mapping of land-use and land-use conversion	Structure of the forest-based sector Taxation and other economic strategies that affect SFM
Binary (a type of qualitative indicator for which the result is measured either by Yes or No, i.e. it has/hasn't been attained or it does/doesn't exist)	Availability of work safety regulations (yes/no)	Existence of a NFP (yes/no)	Mandatory system of management plans in place for forest enterprises (yes/no)

A number of sets of indicators have been developed worldwide to guide and evaluate the achievement of SFM at different levels. They cover aspects ranging from policy, to management, to implementation; and policy indicators have been translated into practical guidance and assessment tools that all share a common reference and principles (see Annex 1 for some examples).

Drawing from existing C&I sets may help national decision-makers and forest administrations to implement more results-oriented SFM and to gather evidence of the outcomes and impact of NFPs (as required by RBM). Most of the regional C&I processes have customized C&I to their regional needs. Examples include the C&I of the Lepaterique Process for Central America, the C&I of the Tarapoto Process for Amazonian forests (Castañeda, Palmberg-Lerche and Vuorinen, 2001), the Montréal Process and cooperative work by the African Timber Organization (ATO) and ITTO (ATO/ITTO, 2003). These existing sets of C&I have substantial value because of their regional specificity and their links to the global set used for FRA.

More examples can be found in the toolkit of the Center for International Forestry Research (CIFOR), which applies a multi-stage development of C&I (Mendoza and Prabhu, 2000a; Prabhu, Colfer and Dudley, 1999), and in the development of C&I for a Forest Management Unit based on the Pan-European C&I and SFM guidelines (Wolfslehner, Vacik and Lexer, 2005).

Relevance of C&I to national forest programmes

National or subnational policy frameworks on forests – along with their management plans – guide decision-making and provide a clear sense of direction over time. Together with national forest policy and forestry-related legislation, the NFP (Box 3) constitutes the basis for SFM at the country level. An NFP is more than just a product – it is a process, in that its development should be holistic, integrated, participatory and iterative.

C&I are potentially important instruments for shaping NFP processes and giving them an operational approach to defining goals, measuring progress and conveying key messages in the context of SFM. They are an essential component of M&E and therefore should be a key aspect of any system designed to assess and report on the progress and changes brought about by an NFP.

C&I serve as a reference for many SFM-related policies and are perceived as safeguarding a normative and comprehensive framework for multifunctional forest management. This implicit normative power of the SFM concept has fostered political commitment to accept and support RBM and to integrate C&I into national policy instruments. For instance, C&I are already included in the results frameworks of many NFPs; and in some cases C&I have been integrated into national legislative and/or policy instruments. Canada and Australia, for example, have incorporated the Montréal Process C&I as a mandatory data collection and reporting mechanism.

Box 3. What is a national forest programme?

Following the United Nations Conference on Environment and Development (UNCED) in 1992 (UN, 1992), the Intergovernmental Panel on Forests (IPF) provided a setting for countries to debate and formally recognize the importance of a comprehensive forest policy framework for achieving SFM. During the three years of IPF, countries agreed on a common approach, known as national forest programmes (NFPs), and adopted a set of principles designed to guide NFP development and implementation (FAO, 2013). Today, NFP processes are under way in more than 130 countries (FAO, 2010a).

The term "national forest programme" does not refer to one specific programme. It embraces a wide range of approaches that can contribute to the formulation, planning and implementation of forest policy at the national and subnational levels. As one of the most important outcomes of international forest policy dialogue, this means that NFPs are applicable to all countries and to all types of forests.

***Source*:** FAO (2013).

While this suggests that RBM is applied to some degree in NFPs, in practice its implementation faces some important challenges and obstacles. First, among the various sets of C&I being used, there is often a strong focus on biophysical and economic indicators (e.g. forest cover [area in hectares] or contribution of the forest sector to gross domestic product [GDP]) which may result, for instance, in biases towards resource indicators and underrepresentation of social indicators (e.g. those pertaining to cultural and spiritual values, net revenue of forest-dependent communities).

Furthermore, C&I processes in NFPs often seem to be shaped by specific stakeholder interests rather than by the demand for balance and comprehensiveness (EFI, 2013). Potential conflicts or trade-offs among land users, land-use forms and environmental and societal interests may not be explicitly addressed by C&I, which often tend to be a collection of parameters (Grainger, 2012). Injecting real RBM logic into NFPs requires a systemic approach to SFM which allows for assessing the interlinkages in a socio-ecological system and the causal effects between inputs, actions and outputs of forest policies and management (Wolfslehner and Vacik, 2011).

In addition, the design of an indicator set should be sufficiently balanced to give a reliable and holistic picture of a planning situation, and over time, accomplishments. It has been observed that indicator sets are often imbalanced and weak in social and cultural aspects (Gough, Innes and Allen, 2008) and in issues of relatively intangible importance in everyday commercial forestry business, such as water protection or nature conservation (Hickey *et al*., 2005). The value of ecosystem services such as clean water and quality wildlife habitat, which are often not monetized, can be demonstrated by careful consideration of indicators related to those services.

Levels of C&I and nesting of results frameworks

In order to ensure an RBM approach to design and implementation, every programme, project or initiative should have its own results framework which identifies the desired results, the criteria for defining them and indicators for measuring them. C&I should be developed for all levels of results within the framework, i.e. for outputs, outcomes and impact.

In turn, results frameworks – or C&I sets – from different programmes or global initiatives can be nested within each other, to demonstrate the linkages between them. For instance, achievement of the objectives of an NFP will contribute to attaining certain SDGs. In turn, the success of the NFP depends on the performance of various national or subnational projects. Each of these (the projects, the NFP and the SDGs) may have their own unique set of goals/objectives, criteria and indicators, yet they feed into one another.

Table 2 presents an example of results chains for interventions at different levels, from a global SDG to an NFP to a community-level project. It demonstrates how the goal (or desired impact) of the NFP directly feeds into the indicator for SDG15, representing a vertical nesting relationship. The alignment between the community project and the NFP is characterized by a horizontal nesting, whereby the project's goal (or desired impact) directly aligns with the NFP's outcome, and its outcome links to the NFP's outputs (most notably output 3).

Operational use of C&I in NFPs

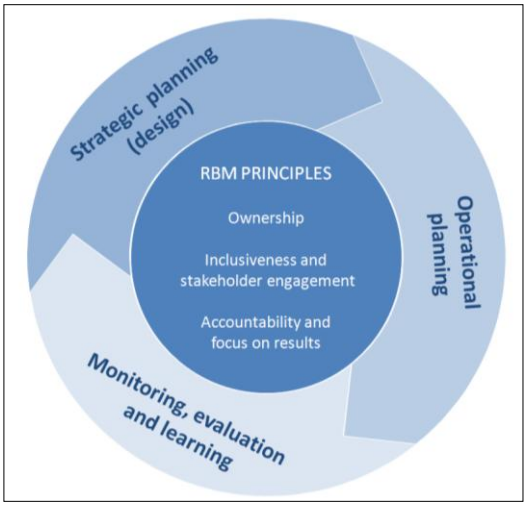
The previous sections have highlighted the important role that C&I and NFPs can play in defining, assessing and monitoring progress towards SFM in a results-oriented approach.

However, the operational reality behind the promise of SFM, and more specifically the use of C&I, poses notable challenges. Practical questions include: Who should be involved? Which factors should be taken into account? What should be measured and/or analysed?

Table 2. Example of three nested results frameworks

Level of result	Objectives and/or criteria	Indicators
Global: Sustainable Development Goal (SDG) #15		
Impact (general objective / goal)	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Forest area as a proportion of total land area
National: national forest programme (NFP)		
Impact (general objective / goal)	The country's forest cover is maintained and sustainably increased in lands designated for forestry	% of the total land area with forest cover % of land under SFM within the country
Outcome (specific objectives / purpose)	Improved forest governance, law and enforcement at all levels	Forest monitoring and reporting system, showing the results and outcomes, updated monthly and available in the public domain Strategic forest decisions taken by the forest authorities in dialogue with other ministries Vibrant civil society participation through a minimum of two cross-sectoral and public meetings per year
Output (deliverables, immediate results)	1. Macro land-use planning that allows for holistic planning across sectors, jurisdictions and local government borders	Kilometers of demarcated forest borders (primarily completed during the past ten years)
	2. Improved awareness and capacity of institutions to enable sustainable implementation of the NFP	Proportion of civil servants in the forest sector able to initiate and implement activities with partners external to the forestry administration as a natural part of their daily routines
	3. Increase in forests allocated for community forestry	Area of forest land (in hectares) allocated for community forestry groups fully recognized with community forestry agreements
Subnational: community forestry project		
Impact (general objective/goal)	Increased participation of civil society in forest governance	Proportion of surveyed beneficiaries reporting increased involvement in forest governance.
Outcome (specific objectives/purpose)	Integrated and sustainable management of the region's forest resources	% increase in forest area under community-led forest management plans in the region
Output (deliverables, immediate results)	1. Increased capacity of indigenous people and local forest communities	Number of people trained in independent monitoring and SFM over the life of the project
	2. Institutional and operational framework for participatory forest management established in the target zone	Participatory Forest Management Committee operational by the end of Year 1 Number of community forestry groups fully recognized with community forestry agreements by end of Year 1
	3. Participatory forest management plans developed and agreed by targeted stakeholders	Number of participatory forest management plans agreed by the end of Year 2

Figure 3. The different stages of the RBM cycle during which C&I are used

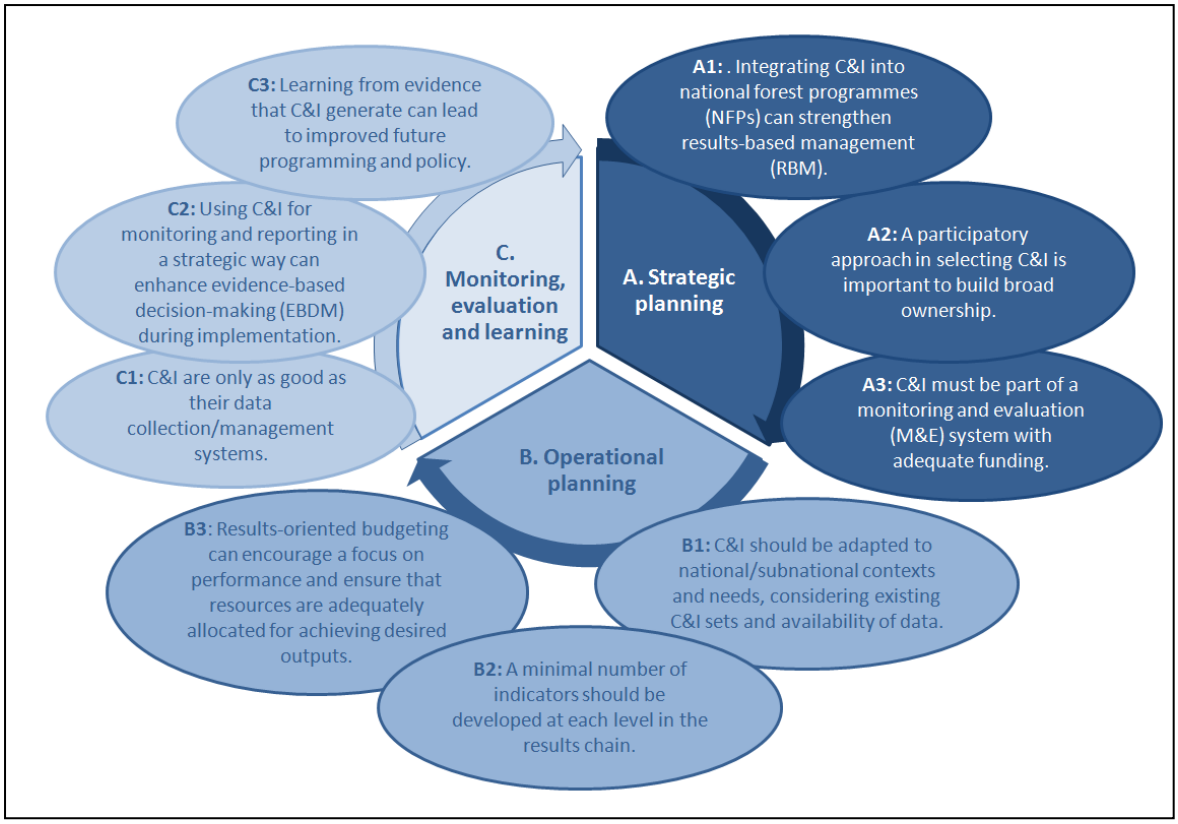


Source: Diagram by Kimberly Ross Kane/FAO

Generally speaking, C&I are most optimally used in three of the main stages of RBM in a programme cycle: strategic planning, i.e. policy/programme design; operational planning; and monitoring, evaluation and learning (MEL) (Figure 3).[1] The following chapters share experiences and reflections from Africa, North and South America, Asia, the Near East and Europe on how C&I may be linked to NFPs at each of these three RBM stages.

Not all of the experiences presented represent success stories. Rather, some reveal the real challenges or gaps that exist in applying C&I. Based on the following findings and analyses, a set of nine tips have been identified, grouped by the relevant stages of the RBM life cycle (Figure 4).

Figure 4. Tips for using C&I for SFM, organized by stage of the RBM life cycle



[1] It is acknowledged that a step occurs between the operational planning and monitoring, evaluation, and learning steps: implementing operational activities. These are the land management actions taken based on the operational planning step. It is the outputs, outcomes and impacts of these operational activities that are monitored or evaluated. But for the purposes of this paper, we do not dwell on implementing operational activities.

3. Strategic planning phase

High-level strategic planning should lead to a concisely described policy, programme or initiative. Those involved should have a clear understanding of what the policy or programme intends to achieve (goals/objectives with criteria) as well as an appreciation for how it intends to do so (via indicators with verifiable data sources).

The strategic planning (policy design) stage is the phase during which a programme and/or its related C&I are formulated. Ideally this involves two steps: first, situational analysis to determine the priority problems and needs to be addressed; second, development of the policy or programme, its results chain and sets of C&I.

Managing by results requires that a programme or intervention be designed in response to a specific, well-defined problem or emerging challenge. Situational analysis and needs assessment are therefore critical for identifying the core problem (or problems) as well as its root causes and possible consequences. Stakeholder analysis is also important at this stage, as it helps to identify who should be involved in the selection of criteria and indicators. Risk analysis is another key aspect of this phase. Once the country context is fully understood, the programme and its C&I can be designed taking national needs, capacities, constraints and risks into account.

Programme design involves defining the desired future situation, articulated within a logical results chain. It also involves determining, from the outset, how one will know whether the desired results are achieved. This is where criteria are particularly important: they define what the public and decision-makers consider the most important social values and what "programme success" means. By identifying the positive changes that the programme aims to bring about, criteria form the basis for defining programme goals, objectives and deliverables (i.e. impact, outcome and outputs), which will need to be tracked with key indicators.

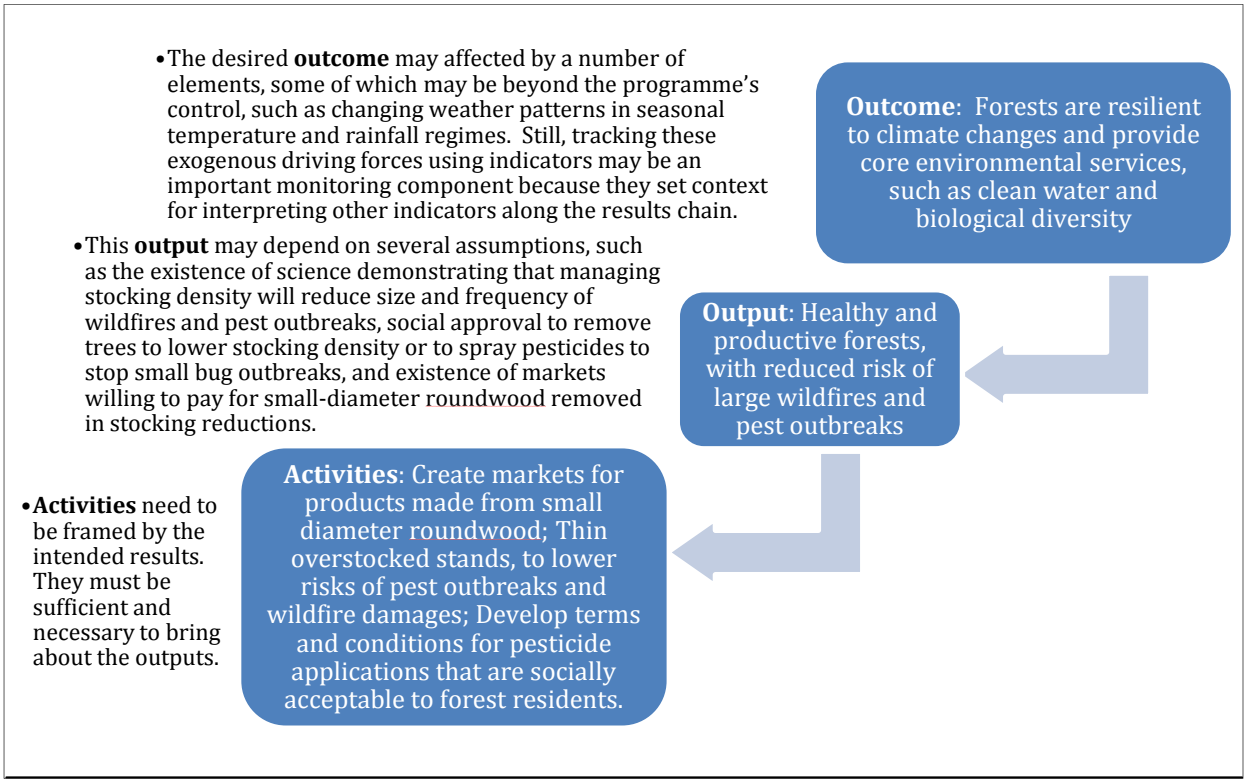
In traditional programme design, stakeholders often jump into activity costing and planning without having determined what changes the activities are intended to bring about and whether, in fact, the activities are necessary and sufficient to catalyse those changes. RBM, in contrast, involves identifying desired achievements (i.e. goals, objectives and intended outputs) before proposing activities. This is what is meant by the recursive relationships among links in the results chain in logic modelling (Figure 5). The planner begins at the end with the desired future situation clearly defined, then works backwards to the operational activities that need to be implemented and the resources needed to accomplish them.

The recursive approach also helps to identify core assumptions and potential gaps in knowledge that need to be clarified before outputs can be specified and activities designed. This may avoid the planning of activities that merely paper over missing links between outputs and results or gaps in scientific understanding.[2]

C&I can be introduced to help shape discussions leading to more clearly defined goals, objectives and, where possible, even targets that are measurable through indicators. This process facilitates discussions on the current status and on how progress and results will be measured and interpreted.

[2] Conducting strategic planning for RBM in this way creates the secondary benefit of identifying a set of research objectives, which can help shape the national forest research agenda. Where little forest research capacity exists in a country, regional and global organizations such as CIFOR, EFI and the International Union of Forest Research Organizations (IUFRO) can help.

Figure 5. Recursive analyses are critical in the strategic planning/design stage



A1 – Integrating C&I into NFPs can enhance RBM

NFPs are intended to provide the necessary strategic orientation for formulating and implementing a political framework that supports SFM at the national and subnational levels. C&I terminology is useful for expressing the conditions and goals of the NFP in widely understood, accepted and scientific language. Consequently, including C&I in the NFP will make forestry efforts more results oriented and thus more likely to achieve SFM. The NFP, in turn, can be a powerful instrument for institutionalizing C&I for SFM.

Costa Rica, for example, in developing its National Forest Development Plan 2011–2020, recognized that it would be essential to measure and monitor its outcomes and impact, as well as to identify risks, threats and weaknesses in the implementation of strategies. In order to do this, the government defined one top policy and 12 forest policies. It then identified the expected results; set targets, which articulate the criteria by which the State will benchmark its achievements; and formulated a set of indicators to enable measurement and evaluation of policies (Table 3).

C&I can be used to design the NFP from the outset, and together they provide structure (through a results framework) and a common understanding of SFM at the national level. C&I can help to identify common topics of interest, streamline language and find agreement on the priorities for policy implementation, funding decisions, data requirements and cost-effective collection methods.

Cambodia, for example, specified nine strategic objectives in its NFP in order to define clear goals, along with strategic indicators which enable the tracking of progress and measurement of results. However, the indicators were not linked to specific objectives. Table 4 shows how the indicators could have been linked to the strategic objectives for a more correct application of C&I and RBM principles.

C&I are a critical element of an NFP's M&E plan. Not only do C&I enable definition and measurement of the programme's desired results, but they can also help to define the targets that should be attained during the implementation of the NFP (Box 4). C&I could also be useful tools for collecting information on the current status of forests, to present the baseline situation from which to move forward (Box 5).

Table 3. Policy, results and indicators in Costa Rica's National Forest Development Plan 2011–2020

Policy	Expected results	Indicators
Top policy: The country's forest cover is maintained and increased sustainably through the valorization of forests and other ecosystems and forest land, ensuring legal certainty, the tenure of the land and the rights of owners and holders to the use of private property to ensure essential goods and services for the quality of life of the inhabitants.	The country's forest cover is maintained and sustainably increases in lands that have a forestry designation.	% of total land area with forest cover.
	The value of forests and other forest ecosystems and their benefits increase in the perception of society.	% of the total area of forest ecosystems in the country in relation to: • the total land area of the country, • the area of land designated for forestry, • the area of forest in protected wilderness areas, • the conversion rate of forests to other land uses.
	Owners of forest and land with a forestry designation find that sustainable production of forest products is attractive and profitable.	Total hectares covered by forests outside the public forest estate.
	Significant increase in added value for the use of timber.	Added value for the use of timber.
	Significant increase in job creation.	Number of new jobs created during the reporting period.
	Significant increase in the area under systems for recognition of environmental services.	Area under systems for recognition of environmental services.

Source: Costa Rica (2011).

Table 4. How strategic indicators could have been linked to strategic objectives in Cambodia's NFP 2010–2029

Strategic objectives	Strategic indicators (2029)
1: Maximize sustainable forestry's contribution to poverty alleviation, enhanced livelihoods and equitable economic growth	• On average, 20 registered and vibrant small- and medium-scale direct and indirect forest-based enterprises or cooperatives operating in each forestry cantonment • Minimum of 50% of processed wood for export will be certified
2: Adapt to climate change and mitigate its effects on forest-based livelihoods	• SFM with prescribed silviculture implemented on 2.4 million hectares of production forest • Current level of forest cover will be increased to 60% of the total land area
3: Macro land-use planning that allows for holistic planning across sectors, jurisdictions and local government borders	• Demarcation of a total 120 000 km of forest borders (primarily completed during the past ten years)
4: Forest governance, law and enforcement at all levels	• Forest monitoring and reporting system, showing results and outcomes, updated monthly and available in the public domain • Strategic forest decisions taken by the forest authorities in dialogue with other ministries and a vibrant civil society through a minimum of two cross-sectoral and public meetings per year
5: Develop a conflict management system	• Larger-scale forest-based conflicts spiralling to destructive levels or hostilities limited to a maximum of two of national attention per year, through the application of conflict management
6: Raise awareness, capacity of institutions and quality of education to enable sustainable implementation of the NFP	• Civil servants in the forest sector able to initiate and implement activities with partners external to the Forestry Administration as a natural part of their daily routines
7: Ensure environmental protection and conservation of forest resources	• Protected forest covers 3.0 million hectares
8: Apply modern sustainable management models adaptive to changing context	• 500 000 hectares of high-value commercial plantation established and 10 million tree seedlings distributed per year • 2 million hectares of forest land allocated for community forestry (approximately 1 000 community forestry groups fully recognized with community forestry agreements)
9: Develop sustainable financing systems	• Annual net revenue from the forest sector of US$125 million • Annual average net income (excluding establishment and maintenance costs) from carbon sequestration of US$25 million • The forest sector will be fully self-financed

Source: Kingdom of Cambodia (2010); Ty Sokhun (2009).

Box 4. Integrating indicators and targets into Costa Rica's National Forest Development Plan 2011–2020

Seven strategic areas were considered essential to the forestry sector in Costa Rica: Planning of forest land; Positioning the forestry sector; Competitiveness of forestry; Sustainability of forestry; Coordination, institutional efficiency and effectiveness; Innovation and sustainability of funding; and Climate change mitigation and adaptation.

For each strategic area, strategic objectives were developed, and for each of the strategic objectives, indicators and targets were defined. Together, these represent the various criteria by which the State will measure success in achieving the mission and vision of the National Forest Development Plan.

Example of Costa Rican criteria and indicators: Strategic Area 7, Climate change, mitigation and adaptation

Strategic objective	Criteria or general Indicator	Indicators with targets
Promote SFM as a key strategy for adaptation and mitigation associated with carbon neutrality	Number of national and international forest carbon transactions in financial terms or tonnes	As of 31 December 2014, a carbon market operating as a result of SFM actions
		From 1 January 2015, a significant increase in forest carbon transactions in markets or international funds
	Volume of consumption of legal locally produced timber	A 10% increase per year in the consumption of locally produced timber for long-term uses

Source: Costa Rica (2011).

Box 5. Viet Nam Forestry Development Strategy 2006–2020

In Viet Nam, owing to unsustainable management, high conversion of forest land and high exploitation of forest products for socio-economic development, the forest area and forest quality have continuously decreased over the years. The Forestry Development Strategy 2006–2020 aims to reverse this situation. It uses indicators to define the current status of the forest sector and to define targets.

Forest cover objective of Viet Nam's Forestry Development Strategy 2006–2020

Description	Year	Forest area *(million ha)*	% forest cover
Historical situation	1943	14.3	43
	1990	9.18	27.2
Current situation	2005	12.61	37
Desired result (Objective)	2010	Not specified	42-43
	2020	16.24	47

Source: Socialist Republic of Viet Nam (2007).

Integrating C&I into NFPs promotes results-based forest-related policy and programmes. Experience has also shown that introducing C&I sets can help to structure the participatory discussions that should underlie the development or revision of an NFP. C&I have the demonstrated ability to streamline terms and concepts, articulate exactly what should be monitored, and enable the comparison of what is comparable.

One of the main principles and strengths of the NFP concept is its emphasis on full participation of stakeholders in policy processes. Stakeholders must participate properly in reaching a consensus, not just be input into a technocratic policy process. In Nicaragua, Peru and Viet Nam, for example, agreement on which C&I should be included in the NFP arose from issue-oriented discussions among sometimes adversarial actors and advocacy groups through multistakeholder platforms, round tables or working groups (Box 6). This approach promotes a collaborative atmosphere in forest policy processes and has been shown to be an essential condition for good use of technical and scientific knowledge and for the willingness of stakeholders to rely on information from multiple sources.

Box 6. Multistakeholder platforms help in choosing C&I in the NFPs of Nicaragua, Peru and Viet Nam

In Vietnam and Peru, information needs assessment was conducted with a wide range of stakeholders to identify priority issues for monitoring, as well as indicators already measured by existing frameworks in order to avoid data redundancy.

In Nicaragua, needs assessments confirmed the importance of fuelwood and charcoal derived from trees outside forests for local community development. This was subsequently included in the national forest monitoring, and the results fed into a new national fuelwood and charcoal policy.

Source: Arnold, Rametsteiner and Kleinn (2014).

Moreover, C&I can be used as a checklist to ensure that all aspects of SFM are considered in the NFP. This can be done by going through the relevant C&I set, comparing it with the outcome or draft of the NFP, and addressing any discrepancies or omissions. For instance, if the NFP says nothing about invasive species but the C&I address them, that is a reason to discuss their possible negative influence on the health and vitality of forest ecosystems in the context of the NFP.

A2 – A participatory approach in selecting C&I is important to build broad ownership

Active involvement of the key stakeholders at all stages of policy/programme design is critical to build a common understanding about the use of C&I in programme formulation and to improve ownership (Box 7).

Some goals and objectives are more difficult to measure than others, and different stakeholders often have quite different (explicit or underlying) objectives on any point; therefore, the process of agreeing on C&I can help clarify differences in focus and in approaches to achieving desired results. In other words, policy-makers, decision-makers and other key stakeholders need to agree upon the priority set of C&I and to develop a joint understanding of their intended use. Seeking agreement or consensus on the C&I – what to track and report on – does not necessarily mean that all parties to the design fully agree on what the current data mean. One party may see a trend in an indicator as positive while another may see it as negative. However, both parties can agree that the indicator is an important one to track.

Such consensus on which indicators to track is important, because it permits parties with diverging views to discuss changes based on a commonly agreed-on suite of information. In the absence of agreed criteria and indicators, parties with divergent views may argue about the current conditions and never proceed to deeper dialogue about the values important to each of them; whereas this richer dialogue becomes possible when stakeholders with different perspectives agree to consider the same information (Box 7).

Box 7. Australia's participatory and consultative approach to building stakeholder support for using Montréal Process C&I

Australia's national policy platform for the management of all forests – Australia's National Forest Policy Statement, released in 1992 – explicitly covers conservation, wood production and ecologically sustainable forest management. The National Forest Policy Statement articulates 11 national goals, which paved the way for the development of forest C&I. In 1994, Australia participated in establishing MPWG, with the aim of providing a common understanding and framework within which to view progress towards SFM at the national level. In 1996 Australia adopted a set of Montreal Process indicators modified to suit Australia's forests.

Strong ownership across a range of stakeholders has been critical to the success of Australia's C&I framework. Ownership was built through a series of consultations with representatives from state, territory and national government agencies; practitioners from different forest types (public and private; natural and plantation; having different management objectives); and industry, academia, research organizations and the indigenous community. These stakeholders participated in open, transparent and candid discussion about options available for collecting and analysing data and summarizing and reporting information. Particular attention was devoted to producing reports and information that were meaningful, relevant and easy to use for stakeholders.

Source: Howell, Wilson and Butcher (2015).

The experiences in Box 8 also show that a set of C&I can serve different purposes and audiences; therefore, it is important to establish a communication system permitting information exchange across different levels.

Another challenge is the potential incompatibility of interests and priorities at different spatial scales. Conservation of biodiversity, for example, is normally given higher priority at wide spatial scales (global, regional, national), while subsistence and livelihoods have higher local priority. For example, in rugged forest landscapes of East Kalimantan, Indonesia, good practices for SFM often call for locating forest roads and skid trails on ridgetops so as to reduce maintenance costs and limit soil erosion. However, this practice would cause the destruction of sago-producing *Eugeissona utilis* palms that grow on forested ridgetops, on which local communities depend for food (Sheil, Nasi and Johnson, 2004).

Many such cases cannot be resolved through local decisions but require optimization techniques at the landscape level as well as a combination of a top-down approach (the most common in C&I) and bottom-up approach (more frequent in certification or scientific case studies). In the worst of cases, C&I without an adequate local foundation (excluding local ecological, social or cultural aspects) may lead to "technological imperialism" (Sheil, Nasi and Johnson, 2004). Consideration of different scales and the combination of top-down and bottom-up approaches in SFM is frequently included in the concept of adaptive management. While adaptive management is often cited as an approach for dealing with climate change impacts, its potential is broader than that; it can also address social, economic and cultural issues which are important components of NFPs (Box 9).

Box 8. Multistakeholder processes for developing and using C&I in the United States of America

The United States of America is a member of MPWG, founded in 1994. In 1996, the President's Council on Sustainable Development issued a policy recommendation on SFM:"Establish a structured process involving a representative group of stakeholders to facilitate public and private efforts to define and achieve the national goal of sustainable management of forests by the year 2000". Later that year, more than 1 500 participants at the seventh American Forest Congress discussed "What common ground do we have with regard to America's forests?"; the congress developed vision elements and a set of principles, many of which included the term "sustainability". These developments led to establishment of the Sustainable Forests Roundtable (SFR), which was self-chartered with federal and non-federal co-chairs, "to serve as a forum to share information and perspectives that will enable better decision making in the U.S. regarding sustainable forests" (SFR, n.d.). The initial focus of SFR was to "implement and promote utilization of the C&I contained in the Santiago Declaration of the Montréal Process as a means of measuring national progress towards achievement of this goal". SFR meetings and dialogues provided the scientific and political foundation and empowerment for the United States' participation in the MPWG. Within a few years, more than 100 organizations and individuals were participating in SFR activities and over 3 000 people were receiving its newsletters and updates. Despite the sometimes divergent values and perspectives among the participants, the SFR was highly important and influential in developing, adopting and using C&I for national reporting on SFM (USFS, n.d.).

The success of the SFR inspired the creation of a similar Sustainable Rangelands Roundtable in 1999, organized to "identify indicators of sustainability based on social, economic, and ecological factors, to provide a framework for national assessments of rangelands and rangeland use" (SRR, n.d.). It developed its own set of C&I for rangelands, modeled on similar concepts, and prepared a rangeland assessment using them.

Source: SFR (n.d.), SRR (n.d.), and personal experiences of R. Guldin, United States of America representative to MPWG.

Box 9. Top-down and bottom-up C&I development in Nepal

The process of adopting C&I in Nepal involved two phases, the first top-down and the second bottom-up. In the first phase, experts and national stakeholders derived a C&I set for the country based on ITTO C&I and CIFOR tools (the CIFOR C&I Toolkit [Prabhu, Colfer and Dudley, 1999]). In the second phase, a bottom-up process was launched to elicit the needs and capacities of community forestry vis-à-vis the C&I. The result was a set of C&I that reportedly improved cooperation between the Nepalese forestry administration and community forestry stakeholders, while helping to overcome unequal power relations, which had previously been prevalent. Using C&I as a common concept to connect different angles of SFM implementation helped bring about a solid consensus on the basic specifications of forest management in Nepal from the outset. It also ensured that the C&I were appropriate at both national and local levels and that community forestry was represented in national forest planning.

Source: Khadka and Vacik (2012).

With many C&I processes having been developed through negotiation among stakeholders, some scientists have asked whether the foundation of the C&I should be "science or consensus" (Sheil, Nasi and Johnson, 2004). McCool and Stankey (2001) proposed two major prerequisites for C&I: consensus among scientists about cause and effect of the ecological and socio-economic processes related to SFM; and political agreement on the objectives (McCool and Stankey, 2001). In other words, "science and consensus", which is an approach more strongly supported by recent examples. Indeed, the translation of information needs into observable indicator variables is partly a research issue and partly a political consensus process (FAO, 2014). Some highly technical processes, such as those of CIFOR, require a political mandate in order to be implemented. But processes of political negotiation, such as the Tarapoto and Lepaterique C&I processes, require the involvement of scientists and experts at all stages of negotiation.

Obtaining multiple stakeholder opinions on the design of the results framework provides an opportunity for discussion and eventual consensus on what good indicators and measures are and what number of indicators will suffice (Box 10).

Participatory processes can be limited by unequal power relations and potential conflicts that risk derailing the process into trivial or irrelevant results with no real influence in practice. It is important that participation be strategic and add substantive value to the development of the C&I sets, rather than be merely an obligatory procedure. Since some groups of stakeholders, especially those living and working in the forests, are generally not used to this type of activity, some preparatory training, explanation of concepts and team-building exercises should be planned to facilitate participation.

Care is needed to ensure that the right depth and breadth of stakeholders are involved so that the process is not "captured" by a subset of stakeholders, because a selective, interest-driven process may lead to unbalanced C&I sets that do not reflect the whole local picture (Box 11). The number of stakeholders must also be kept manageable to prevent "analysis paralysis".

Box 10. Participative process in Mexico

Mexico developed C&I for the temperate and tropical forests of the southeastern part of the country through the review of C&I from 14 national and international initiatives (e.g. Central American Lepaterique Process, Amazon Cooperation Treaty Organization [ACTO], ATO, ITTO, Montréal Process, Forest Stewardship Council [FSC]). The selection was completed with C&I generated for the specific Mexican social, cultural and legislative context.

The integration and the implementation of C&I was a participatory process of knowledge exchange, conciliation of different interests and cultural enrichment. This made it possible to integrate the reality of ejidos and communities, including social aspects of local culture and governance significant for the sustainability of forest management. An ejido is an endowment of land given to a rural settlement. The endowment includes three types of land: urban land, plots and communal lands. It is governed by a system of ejidal (community) representation positions, the General Assembly being the highest body of representation in decision-making.

For each indicator, verifiers were created; and for each verifier, a reference value or standard was defined. Each reference value had three performance levels: limited, medium, good. This enabled the current state of sustainability of forest management to be more realistically and accurately taken into account during the evaluation process.

Source: Fabiola Reygadas Prado, Researcher, Forest Management and Environmental Services Programme, Instituto Nacional de Investigaciones Forestales, Agricolas y Pecuarias (INIFAP), Mexico.

Box 11. Multistakeholder consultations in adopting the ITTO C&I in the Philippines

The Philippines has adopted the ITTO C&I system for SFM. In this process, nationwide multistakeholder consultations were held in which the challenge was to consolidate the varied interests of stakeholders representing all sectors in the forest and wood-based industries, academic and research institutions, associations of tree farmers and indigenous peoples who are holders of certificates of ancestral domain claims/titles or land claims/titles. Stakeholders mainly concerned with net economic benefits had high expectations because they equated the system with recovery of high transaction costs. Civil society representatives, including NGO groups, were divided on the use and applicability of the C&I system. These groups have different interests, understanding, backgrounds, aspirations and sometimes political agendas. Nevertheless, the highly participative process of the multistakeholder consultations helped generate greater awareness of the need for the C&I system and for audit procedures for SFM.

Source: Briz (2015).

In many countries, the groups and technicians familiar with C&I do not necessarily consider how to integrate them into national forest policies (such as the NFP) and vice versa. One of the challenges is thus to bring these groups to understand that C&I and NFPs are complementary and can be mutually reinforcing if used in an integrated way. It is recommended that the key stakeholders involved in NFPs discuss and agree on the idea of using C&I to define and monitor the NFP.

A3 – C&I must be part of an M&E system with adequate funding

SFM can be achieved only if forest policy and management decisions are based on an M&E system that produces up-to-date and statistically robust evidence on forest resource conditions and their changes (Box 12). The foundation of an M&E system is the results chain/theory of change and its corresponding C&I. Yet an M&E system is not complete without a practical, detailed plan for data collection, processing, analysis and reporting, which specifies the methodologies, timelines, and roles and responsibilities for each stage.

Box 12. Linking national forest monitoring to national policy planning

With their aim of producing relevant and credible data, national forest monitoring (NFM) systems undeniably have important technical aspects. However, their policy dimension is also crucial, in other words the translation of data into meaningful information and the target-oriented use of such information. Therefore, NFM must never be exclusively technology driven or considered only from a technical point of view. Monitoring is never an end in itself, but serves a specific function within complex information and decision processes.

In recent years, renewed attention has been given to large-area forest monitoring in the context of discussions on measuring, reporting and verification (MRV) for REDD+ (Reducing Emissions from Deforestation and Forest Degradation in Developing Countries, including the role of conservation, sustainable management of forests and enhancement of forest carbon stocks). In the coming years huge investments in national forest monitoring may be seen in many countries as part of their MRV systems, through bi- and multilateral official development assistance as well as national sources. This monitoring must produce data that are not only technically reliable and cost efficient but also relevant to and accessible for stakeholders. NFM systems need to satisfy the information needs of decision-makers and stakeholders; stay within the boundaries of budgetary capacities; achieve acceptable levels of reliability; and have operational procedures adapted to national capabilities.

Arnold, van der Werf and Rametsteiner (2014) proposed a set of six guiding principles – relevance, strategic orientation, reliability, efficiency, accessibility and sustainability of information provision – which cover general technical as well as procedural aspects useful for NFM planning. These principles are applied in five key action areas for developing and implementing a planning process for new or recurrent NFM: participatory planning; information needs assessment; survey and data collection design; data management/access to information; and communication and capacity development. Countries address these principles during the NFM planning process in ways adapted to their needs and contexts. This approach should allow countries to consider systematically the choices for NFM designs with a view to strengthening evidence-based policy- and decision-making. Regular feedback among key participants at all times during the planning and implementation process of the NFM is essential, as is participants' active involvement in the interpretation of results and the use of NFM outputs. NFPs or similar policy dialogue platforms are well suited to support efforts to this end.

Source: Arnold, van der Werf and Rametsteiner (2014).

Activity monitoring, also known as implementation monitoring, tracks progress in implementing operational activities as planned. In providing data on work being accomplished and on accounting of expenditures compared to budgets, activity monitoring is essential for programme management and budget purposes. However, this type of monitoring alone is incapable of tracking results. Monitoring and evaluation of outputs, outcomes and impacts are necessary to answer the broader questions about whether the work being done is leading to the desired future ecological, economic, social and cultural results.

Monitoring involves routine data collection and reporting (to measure activity and output indicators following standard protocols), while evaluation is an occasional study involving research methods (generally to measure outcome and impact indicators, although sometimes also output indicators, depending on their scope).

The design of an M&E system consists of three main steps:

- The criteria must be clearly defined within the results chain and a set of indicators selected for each criterion which, considered together, will provide useful information about the current status and recent trend of its different dimensions.
- For each indicator, a set of measurement protocols for collecting data and a set of models for transforming the data into useful information must be identified.[3] This involves identifying feasible and reliable data sources or means of verification (MoVs); determining the appropriate data collection methodologies and quality assurance processes; and outlining the data flow from the frontline source up to the various levels at which data will be processed, synthesized and disseminated.
- Mechanisms and tools to summarize, report and archive the data must be developed and put into operation, which generally involves the creation of data analysis plans, databases and the training of staff and partners.

Designing a good M&E system is an important technical process involving some complexity. The details are beyond the scope of this paper, but excellent resources are available (e.g. USFS, 2015b; Bechtold and Patterson, 2005).

The ability to analyse data on C&I and compare trends over time (often many years) requires a certain regularity of available, consistent and valid data. Thus, for each indicator, several things need to be identified: the data sources (MoVs), collection and estimation methods, data collection tools and, as applicable, models; the statistical sampling framework (for evaluation); the timing and frequency of the data collection; the training required for data collectors and data entry personnel, including safety training, if needed; and the responsibilities of the several types of actors involved for each indicator. These details should be documented in an M&E Plan, which ideally also specifies the baseline and target for each indicator (Table 5).

The quality of data collected through C&I must be high. A number of European and North American countries have included objectives for the precision of key estimates in M&E system design (Box 13).

Information provided by forest monitoring activities plays a key role in many international agreements. At the same time, national information needs on forests have grown considerably in recent years. These needs have evolved from forest area and growing stock information to cover other key aspects of SFM such as the role of forests in the conservation of biodiversity, the provision of other ecosystem services, and information on carbon stocks or socio-economic aspects (Box 14).

[3] Much biological information cannot be directly measured. Take tree volume, for example. In the field, tree diameter is measured and tree height is estimated. Then, in the office, the diameter measurement and height estimate are inserted into the appropriate volume estimation equation for the given tree species to compute a tree volume estimate. Going further, the volume estimates for a sampling point are then further processed using statistical models based on the sampling design to estimate volume per hectare. The bottom line is that monitoring is a combination of fieldwork and office work to develop information that is easily understood by stakeholders and policy-makers.

Table 5. Nigeria's National Biodiversity Strategy and Action Plan (NBSAP) M&E plan

Type of indicator	Indicator	Responsibility	Data for indicator		Data gathering methods	Means of verification	Collection and reporting frequency
			Baseline	Target			
Impact	% of the population aware of the importance of biodiversity	Federal Department of Forestry (FDF)	N/A	30% in 2020	Surveys of representative groups of the population or Estimate of number of people reached by outreach activities	Survey results or Results of estimate	Start and end of programme
Performance	No. of outreach & awareness campaigns	National Orientation Agency (NOA)	N/A	20 in 2020	Review of outreach campaign reports	Annual Report	Annual
Performance	No. of public discussions	NOA	To be imputed by FDF	10 in 2020	Review of public discussions Reports	Newsletter, NOA reports to NBSAP	Annual
Performance	No. of states in Nigeria with outreach activities	NOA	N/A	At least 50% in 2020	Review of outreach activities and reports at annual NBSAP meeting	Newsletter	Annual

Source: Federal Republic of Nigeria (2015).

Box 13. Public-private consensus to enhance cost-effective sample design in the United States of America

Every country, in the planning phase, must adjust or optimize the M&E system design for the particular country circumstances. This is usually not a standard task; methodological expertise is required to come up with a customized design. In the United States of America, extended discussions were held with external stakeholders dependent on forest inventory data for their investment decisions in land management and mill developments. These discussions led to public-private consensus on the desired precision of area and volume estimates at the subnational level: for area, ±1 to 2 percent per million hectares of forest land; for volume, ±3 to 4 percent per 100 million cubic metres of growing stock volume (both expressed at the 67 percent confidence level). These desired levels of precision strongly influenced the intensity of the base sampling grid (one field sample point per 25 km^2), which was designed to achieve high cost efficiency in field measurements and office estimations.

Source: Bechtold and Patterson (2005), USFS (2015a), R. Guldin (personal communication).

Box 14. National forest monitoring and monitoring, reporting and verification systems for REDD+

In REDD+ (and in other payments for ecosystem services), developing countries will be financially rewarded for successful implementation of pro-forest sustainable policies. The corresponding payments in many programmes will be strictly performance based and released only when there is credible evidence that the agreed and announced goals have been achieved. This credible evidence is largely generated by indicators. To provide the required information efficiently, NFM systems employ various data sources, the most important being sample based field observations, remote sensing, allometric models and available prior information from earlier monitoring studies.

The NFM system is therefore a key tool for demonstrating the results of REDD+ activities in terms of both mitigation and wider impacts on the forestry sector. The monitoring system for REDD+ could contribute to the NFM system to provide information on REDD+ safeguards as well as information for other purposes such as meeting reporting requirements under other conventions besides the United Nations Framework Convention on Climate Change (UNFCCC). Countries can use the monitoring tools to develop a system for cost-effective and equitable resource allocation (or benefit distribution), such as the Amazon Fund in Brazil. Brazil's pioneering Amazonian monitoring system, based on satellite remote sensing, was an effective precursor to monitoring for REDD+. This system allowed the country, for the first time, to assess forest cover changes across the Amazon and therefore to allocate forest law enforcement resources accordingly. Monitoring for REDD+ could be based on new tools (e.g. a monitoring system based on satellite remote sensing, as in Brazil) or on monitoring tools already used in the forestry sector, or a combination of the two.

Source: UN-REDD (2013).

Cost efficiency is a key challenge of an M&E system. Some countries involve few people and use sophisticated technology to reduce costs (Box 15).

C&I-based M&E systems should, to the extent possible, use and improve existing information and reporting systems at different levels and from different agencies. In some cases, it might be helpful to consider using data sources that are accessible with new technologies (if they are cheaper and faster or address an aspect that is not measured at the operational level). Collect Earth, for example, enables a quick view of the big picture, providing reliable monitoring at policy level without the trouble and expense of more detailed on-the-ground monitoring systems (Boxes 16 and 17). This could be an interesting approach for monitoring the results of NFPs.

Box 15. Cost-effective monitoring approaches in Finland

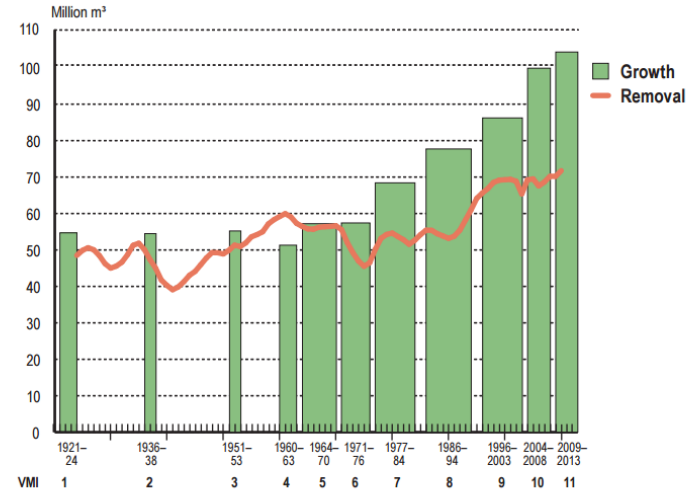
Finland's National Forest Inventory (NFI) is a monitoring system that produces information concerning national and regional forest resources: volume, growth and quality of growing stock, land use structure and forest ownership, forest health, biodiversity of forests, and forest carbon stocks and their changes.

Finland's first NFI was carried out in the 1920s. Since then, NFIs have been conducted regularly in 5 to 10 year cycles. Over the years, Finland has found ways to reduce the cost of M&E through careful analysis of the cost-benefit ratio for each parameter in the system. Cost efficiencies have been achieved by applying sampling techniques, using more sophisticated technology and optimizing human resources so that fewer experts are needed for M&E.

Forest resource information produced by NFIs is based on extensive field measurements. In the first inventories, lines through the country were surveyed; in recent inventories, systematic sampling and field plot measurements have been used. Based on the samples of field data, reliable forest statistics can be calculated for the whole country (Figure 6). The multi-source NFI utilizes several data sources: field measurements, satellite images and digital maps. With this method, forest statistics and thematic maps can be produced for any given area.

The forest statistics and other information produced by the NFI are widely used for national forest policy-making, regional and national forest management planning, forest industry investment planning, assessing the sustainability of forestry and evaluating greenhouse gas emissions and changes in carbon storage, as well as in forest certification and research.

Figure 6. Forest growth and removal in Finland, 1920–2013



- Removal figures are presented as floating averages over five-year periods. They include also natural loss.
- Estimates of growth refer to the inventory years respective.
- VMI denotes National Forest Inventory.
- The results of VMI 3–5 have been corrected to allow comparisons with later inventories.
- Sources: Statistical Yearbook of Forestry 2014, Finnish Forest Research Institute.

Source: Natural Resources Institute Finland (2014), Finnish Forest Association (2014).

Box 16. Cost-effective technology in monitoring: using Collect Earth in Papua New Guinea

Deforestation and forest degradation are major contributors to global greenhouse gas emissions. To reduce emissions effectively, countries need to know how much forest they have, how much carbon it contains and how much of it is being lost.

To help countries obtain this information, FAO, in collaboration with numerous public and private institutions, launched the Open Foris initiative, providing a set of free, open-source, user-friendly software tools that facilitate flexible and efficient forest monitoring. The tools can be used around the world to gather information regarding forest area, to assess woodland condition and to measure woodland use and carbon storage. The applications are flexible and can be customized to suit different environments and different environmental guidelines (such as those of the Convention on Biological Diversity [CBD] and the United Nations Convention to Combat Desertification [UNCCD]).

A key monitoring tool is Collect Earth, which enables users to collect high-resolution satellite images via Google Earth. These images can then be used to create forest inventories as well as forestry and land-use plans, and to quantify deforestation and other forms of land use change. Using cost-effective technology and methodologies, Collect Earth has allowed the development of an important database. It provides information about status and trends required for the management of natural resources and for monitoring programmes and long-term policy outcomes.

The forest authority of the Government of Papua New Guinea has undertaken land-use and land-use-change assessment using this tool. The information collected shows that 37.6 million hectares of forest land remain under forest while almost 1.7 million hectares of previously forested land have been converted to cropland. This information can assist the government to make informed decisions on sustainable forest and land management.

***Source**:* Open Foris (n.d.).

Box 17. The Global Drylands Assessment: a cost-effective method for monitoring

The Global Drylands Assessment is a thematic study complementing FRA 2015 but differing from it in both scope and method. No individual country reported data to the assessment and no official country information was used. Instead, the assessment – which focuses solely on drylands – was based on visual interpretation of satellite images in publicly available repositories such as Google Earth and Bing Maps. The result are reported at the global and regional levels, not by country.

The assessment draws on information from thousands of sample plots of approximately 0.5 hectares. Sample-plot data were collected from online libraries of satellite images using Collect Earth (see Box 18). For each sample plot, data on more than 70 characteristics were collected and recorded for the most recent point in time for which satellite images were available. The variables were selected to characterize land cover, land use, land use change and other significant land dynamics (such as desertification and greening) along with biophysical indicators.

The Global Drylands Assessment is the first statistical sampling based assessment of land use, including forests and tree cover, in the world's drylands. It therefore provides a baseline for monitoring changes in dryland forests, tree cover and land use – globally, regionally and by aridity zone.

The combination of technologies developed by FAO and Google provides a new and economically feasible way of assessing trees, forests, land use and land-use change in any area of the world. FAO intends to apply the methodology in a global pilot assessment of all types of land and will also assist individual countries in developing country-level applications on request.

Source: FAO (2016a,b).

One of the major issues in implementing RBM is the availability of budgets or the willingness of decision-makers to provide the necessary funding to achieve and/or measure the results. National forest inventory and monitoring was long viewed as an issue exclusive to forestry, therefore receiving little attention from government and from other sectors in many countries. For many years, national forest inventory and monitoring in developing countries was mostly implemented by technical cooperation projects through international or bilateral cooperation. These projects were by nature limited in time and scope (relative to programmes) and were not institutionalized sustainably within the national administration. This has changed considerably. Many countries now recognize their forests as a national asset for which up-to-date data and information are needed in order to monitor status and changes over time and as a basis for informed decisions. National forest monitoring may be considered one among the standard survey activities that governments implement in order to be informed, including population censuses and economic surveys. Only by means of comprehensive, reliable and transparent data can informed decisions be made, communicated and defended on scientific grounds.

Many programmes, especially in developing countries, are increasingly implemented with mixed funding (international and national). Relatively high shares of the finance have to come from national governments or financial institutions that governments work with (e.g. regional banks). A clear budgetary framework does not always exist right from the beginning of the planning phase. Collaboration among countries is one way of improving cost efficiency (Box 18).

As the examples in this section point out, monitoring costs money, and evaluation costs even more. In some countries, the forest department budget may not be sufficient for adequate planning, monitoring and evaluation. However, monitoring should not be considered optional; without proper monitoring, funds committed to NFPs and government land-management activities may be wasted, and third parties may be disinclined to support NFPs.

Box 18. Cost-effective monitoring approaches in Canada, Mexico and the United States of America

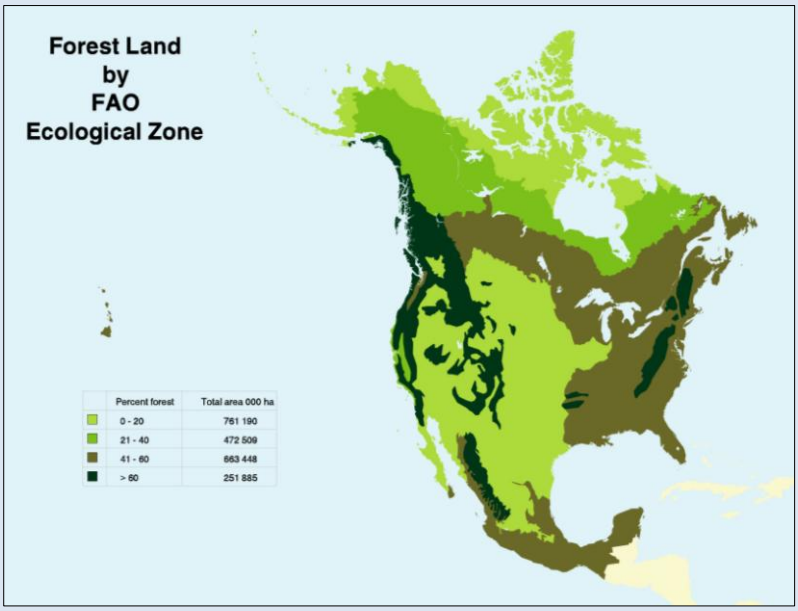
Canada, Mexico and the United States of America, working together through the North American Forestry Commission's Inventory and Monitoring Working Group, developed a consistent approach for estimating key forest variables across all three countries (Figure 7). This work led to further joint efforts to develop the inventory and monitoring programmes in all three countries to expand capability for continent-level analysis and reporting.

Four variables in each nation's inventory and monitoring database were found to be compatible: area of land, area and volume of forest land, area of other wooded land and area of water. Forest area and volume could be further broken down by forest type (coniferous, mixed and broadleaved) and land could be classified by ownership (public, private).

The integration was possible largely because the sampling framework and plot design in Mexico and the United States were the same and were similar to those of Canada. The core variables are similar for the three countries, differing only slightly in definitions. All three countries use remotely sensed imagery to make initial area estimates, combined with limited subsampling of field plots to confirm the classification algorithms used to assign values to pixels in the imagery. This blend of technology, automated classification modelling and limited field data collection results in highly cost-efficient programmes and a level of accuracy that meets the precision objectives developed through stakeholder consultation and consensus building.

The working group also concluded that the need for harmonization among inventory programmes and their indicators increases with the reporting level, along the continuum from subnational (e.g. management unit, province or state) to national (e.g. reports on national C&I processes, national state forest assessments) to continental or global (e.g. Commission for Environmental Cooperation, FRA). The integrated database developed illustrates the potential to support reporting on local, national and global issues.

Figure 7. Forest land by FAO ecological zone in Canada, Mexico and the United States of America



Source: Gillis *et al.* (2004).

4. Operational planning phase

Operational planning operationalizes the strategic level policies and programmes that were formulated in the previous step. During this phase, operational plans – such as multi-year workplans and/or annual action plans – are developed and used to guide implementation of programme activities, in order to bring about the expected results. Staffing plans and budgets are other important aspects of planning, as they help ensure adequate resource allocation for the execution of all necessary activities. High-quality work in the design stage will help to create essential documents for justifying staffing and budget decisions.

B1 – C&I should be adapted to national/subnational contexts and needs, considering existing C&I sets and availability of data

C&I need to be nationally tailored so that they are feasible and practical as well as accepted and justifiable for users. Generic global or regional C&I sets can be adapted to national or subnational conditions, or completely new, specific indicators can be developed that pertain to specific goals and objectives related to attaining SFM nationally. It can be useful to consider existing C&I sets and to revise them as needed so that they are geared towards measuring the national policy objectives. If an aspect that is important at the national level is not mentioned in the existing C&I set, specific indicators can be added to the national C&I set.

Existing global sets of indicators often focus on high-level, generic results (e.g. forests as percent of land area), and it can be difficult to adapt them to national or subnational needs and priorities. The Russian Federation, which is involved in the Montréal Process and Forest Europe, based the indicators in its Forestry Sector Development 2013–2020 programme on the rather abstract Montréal Process indicators, but made them more specific to be consistent with the country's international engagements (Table 6).

Adapting C&I to the national or subnational context involves making sure that local capacity is adequate to design and use the proposed C&I. The country's capacity to collect, analyse and use data should thus be considered when the final sets of C&I are prioritized and selected at the national or subnational level. To the extent possible, it is recommended to use existing indicators (if they are relevant and feasible) in order to ensure validity and keep costs down.

Involving stakeholders in feedback loops and data analysis will help to avoid a system that merely generates information mechanically. Stakeholder involvement can be challenging and must be carefully managed, because the different interests of stakeholders may lead to an overly long list of indicators (Box 19).

Table 6. Russian Federation's adaptation of Montréal Process C&I

Montréal Process indicator	Russian NFP 2013–2020 indicator
Criterion 2: Maintenance of productive capacity of forest ecosystems	
2.a. Area and percent of forest land and net area of forest land available for wood production	Proportion of the entire area of forest resources that is leased (target: 26%)
	Share of the total amount of wood harvesting that consists of cultivation and improvement cuttings (target: 25%)
Criterion 6: Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of society	
6.2 Investment in the forest sector 6.2.a. Value of capital investment and annual expenditure in forest management, wood and non-wood forest product industries, forest-based ecosystem services, recreation and tourism	Kilometers of forest roads constructed per year (target: 6 200)

Source: METLA (2013).

Box 19. Cuba's experiences in choosing C&I

In Cuba, the selection of indicators for each criterion was a complex process because the stakeholders involved lacked experience and tended to propose an excessive number of indicators in the early stages of the process. Cuba's established system for forestry work allows for the possibility of including new indicators based on local interests. Twenty-four indicators were initially chosen, but the stakeholders were not adequately engaged to prioritize them at the time. In 2005, new indicators were selected and others were eliminated, taking into account their relevance, data availability and cost efficiency (i.e. whether the cost of obtaining the information outweighs the importance of the indicator for the assessment criterion). According to the Cuban experts involved in the process, "where this has been done, it is like a light that illuminates the way forward; where this has not been done, it is like working in the dark". They also found that it is preferable to start working with only a few indicators, and then subsequently to add others.

Source: Herrero Echevarría (2015).

While establishing and using the list of C&I for a national forest programme or policy, it is also important to consider international and national engagements and requirements. NFPs have to be consistent with national planning frameworks and global initiatives; thus NFP C&I should be aligned with those of regional and/or global conventions or broader national strategies or programmes. Results frameworks can be nested or aligned so that criteria (objectives) of one programme feed into the criteria (objectives) of other programmes, either vertically or horizontally. It is also important to maintain the link with overarching C&I processes, to have a common reference point and comply with standard definitions and reporting duties. Regional cooperation and harmonization on C&I can help with reporting (Box 20).

Gunter, Louman and Oyarzún (2012) illustrated how the Lepaterique and Tarapoto processes linked C&I at the management unit and national levels. The national-level C&I of both processes for tracking forest health show clear similarities to those of the Montréal Process (Table 7).

Alignment within a country takes priority over alignment with international requirements. It is important to ensure alignment and linkages with relevant results frameworks and C&I sets. The idea is that various projects and interventions contribute together to the national development objectives articulated in an NFP, while the combined efforts of NFPs of various countries contribute to achieving regional and global development goals. In this regard, it is important to demonstrate how each of the programmes (and sets of C&I) are related, to keep the higher-level, longer-term aims of these initiatives in sight (Box 21). Otherwise opportunities for synergies and collaboration across interventions may be lost.

Discussions among stakeholders should be open and transparent until the final choices are made. It is only through genuine participation that divergent views and conflicts of interest between various stakeholders can be openly recognized and, where possible, resolved with a broad consensus (Box 22).

Box 20. Monitoring forest coverage in the Amazon region in ACTO

The eight member countries of ACTO (Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela) agreed to monitor their vegetation cover changes periodically, and all (except Brazil) prepared national forest cover monitoring plans. Three important indicators of SFM (deforestation, logging and land use change) will be measured at the national level. This agreement should be seen as the start of a complete harmonization process which may include other countries in the region as well as other SFM indicators.

The ACTO members also developed and validated the first regional map of deforestation in the Amazon, presented at the 20th Conference of the Parties (COP-20) of UNFCCC in Lima, Peru in December 2014.

Source: ACTO (2014), Rubin de Celis (2015).

Table 7. C&I related to health and vitality of ecosystems in the Montréal, Tarapoto and Lepaterique processes at the national and management unit levels

Montréal	Tarapoto (National/global)	Tarapoto (Management unit)	Lepaterique (National)	Lepaterique (Management unit)
Criterion 3: Maintenance of ecosystem health and vitality			Criterion 3: Forest health and vitality	2.2. Area and percentage of types of forests affected by forest fires, pests, and diseases
3.a. Area and percentage of forest affected by biotic processes or agents (for example, diseases, insects, invasive species) in comparison with control conditions	4.d. Area and percentage of forests affected by different processes or agents (pests, diseases, fire, and flooding, among others)	10.c. Area and percentage of forests affected by natural processes and agents (pests, diseases and fire, among others) and by human action	2. Area and percentage of forests affected by different natural agents	2.3. Evaluation of damages and application of measures to mitigate impacts of forestry operations, fires, pests, and diseases.
3.b. Area and percentage of forest affected by abiotic agents (e.g. fire, hurricanes, clear-cutting) in comparison with control conditions			2. Area and percentage of forests affected by different natural agents	3.9. Measures and application to prevent and control forest fires
			3. Area and percentage of forests affected by anthropogenic causes	3.16. Area and percentage of total forest affected by change in soil use or by natural agents
				2.7. Area and percentage of total forest affected by change in land use or by natural agents

Box 21. Peruvian Bicentennial Plan Towards 2021 links forest and development sectors

Peru has 73.3 million hectares of forests, equivalent to 60 percent of the country's territory. Deforestation, even if relatively low (0.2 percent annually), is the primary source of greenhouse gas emissions in the country. In order to meet its international commitments, and in response to internal pressure from national stakeholders including indigenous peoples, the private sector, NGOs and subnational governments, Peru is undergoing a process of public sector forest management reform.

The Peruvian Government has stated a goal of preserving a total of 54 million hectares of forest, reducing its rate of deforestation to zero by 2021. This goal was included as a national goal in both the National Environmental Action Plan 2011–2021 and the Peruvian Bicentennial Plan Towards 2021 (CEPLAN, 2011). By ensuring a percentage of permanent production forest under management as a national goal, Peru shows its intention to promote C&I in the public sector and ensures links between development strategy goals and the C&I of the forest sector.

Source: CEPLAN (2011).

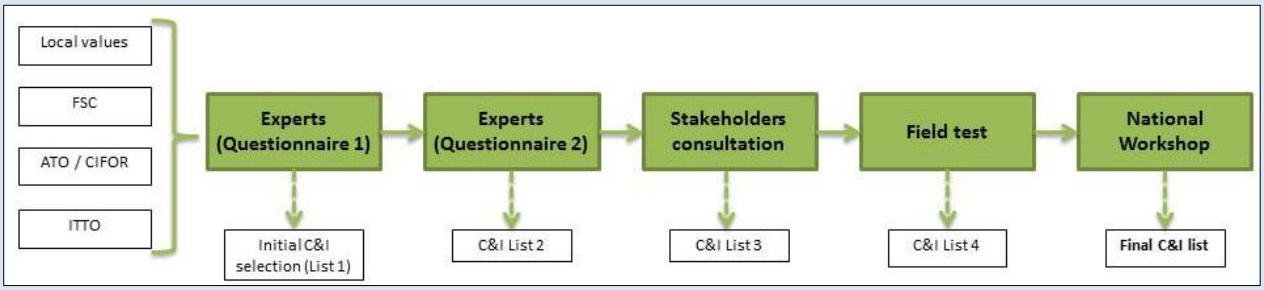
Box 22. Participatory approach in adapting ATO/ITTO C&I to the Gabon context

The ATO/ITTO C&I framework defines seven criteria of SFM. Indicators are adapted to the context of each member country. To arrive at a final list of locally adapted C&I in Gabon, a team of multidisciplinary experts reviewed existing C&I (ATO/ITTO, CIFOR, FSC, etc.), field testing was conducted, and national forest issues were considered (Figure 8). The local adaptation of C&I for SFM involved wide stakeholder consultation through:

- national working groups including, for example, landowners, civil society, NGOs, local communities, women's groups, independent bodies, industry, research and academic institutions and government;
- national workshops for validation of the C&I, which were open to all stakeholders.

Before the final validation of the national C&I, field testing was done to evaluate the relevance of the adapted C&I to the local realities.

Figure 8. Participatory approach used in Gabon to adapt ATO/ITTO C&I to the local context



Source: Ondo (2015).

Showing the linkages and alignment between different forest-related programmes within a country and their C&I sets can also facilitate the process of developing C&I and communicating about and reporting on results. As mentioned earlier, these relationships can be represented through vertical or horizontal nesting of results frameworks. Yet linkages among different sets of C&I are often less structured or less direct.

It can be helpful to refer to existing C&I sets for inspiration or adaptation. Also, indicators that are already in wide use should be selected for efficiency and effectiveness – for example, the 17 indicators used globally for FRA 2015. Furthermore, making reference to established C&I sets (which already have agreed definitions) within the NFP increases the likelihood that the NFP's C&I will be understood by a wide audience and that different stakeholders, public and private, can align their actions on a specific programme component (Box 23).

Box 23. Adaptation of C&I in European NFPs

A recent evaluation indicated that more than half of European countries have NFPs and most of them employ C&I to some extent, whether at the national or subnational level. France, for example, developed national C&I which should serve both national and subnational purposes. Italy uses C&I for identifying SFM targets at the subnational level, and the Spanish region of Catalonia used C&I to define discussions on carbon sequestration and adaptive forestry at the subnational level.

Many European countries apply regional C&I sets to national contexts through their NFPs, particularly the Pan-European C&I of the Forest Europe process. Finland and Austria, for instance, launched separate C&I development processes that built on the Forest Europe process but allowed ample space for adding indicators that reflect the needs of the stakeholders.

Overall, the commitment of European countries to a Pan-European C&I set provides a well-accepted foundation for further development in NFPs. As national C&I can be mostly seen as a soft obligation in implementing SFM, accepting national specificities gives countries freedom to incorporate stakeholder perspectives and give additional credibility to NFPs. This would also imply the option to reach down to management-level indicators, which are not at present widely implemented in Europe. Forest certification has already opened an avenue for adapting C&I for management and local levels; the Programme for the Endorsement of Forest Certification (PEFC), which exists in parallel with FSC, has direct connections to the Pan-European C&I and the Pan-European Operational Level Guidelines for SFM.

Source: EFI (2013).

While NFPs and C&I serve well to establish a common understanding and to streamline forest-related debates, they are often limited by sectoral boundaries. Hence, in an NFP process it is important to keep track of new emerging and/or cross-sectoral issues that might affect the forest sector. This requires outreaching communication and common efforts with related C&I initiatives outside the forest sector. For instance, a future direction towards bioeconomy or green economy may encourage streamlining of forest C&I and integration of issues from other sectors into NFPs. A more holistic approach to climate change mitigation and carbon sequestration is needed to place forestry issues in the arena.

In Europe, some integration of bioeconomy and climate change strategies in NFPs has been observed (Linser and Wolfslehner, 2015), with ongoing discussions about how to integrate C&I from different sectors (e.g. biomass, bioenergy) for more holistic C&I. In the United States of America, the Department of Energy tracks the generating capacity of wind turbines and how many of them are installed in forests. The contribution of the forest to wind-driven electricity generation has a market value as an ecosystem service. Forest-based climate change mitigation is another example of a potential cross-sectoral impact between the forest and energy sectors.

Providing linkages to other sectors at the national level may require including some C&I that pertain to related sectors or sustainable development in general, rather than limiting the C&I set to traditional forest sector results. Adopting a holistic approach, even if it adds an additional layer of complexity, can lead to joint data collection at the national level, avoiding data duplication and increasing cost effectiveness by raising co-funding from other sectors. Synergies can be harnessed in measurement and assessment as well as in harmonization of definitions and terminology – all of which C&I can facilitate.

The increasing interest of different organizations and initiatives in using C&I (e.g. ITTO, Forest Law Enforcement, Governance and Trade [FLEGT], REDD+) has motivated many in-country agencies and NGOs to collect national-level forest data. These parallel efforts can lead to considerable differences of forest data across agencies, fragmentation of data and avoidable data duplication. It is thus recommended that all agencies concerned with forests should start their monitoring and policy formulation from the national C&I framework.

Many countries use C&I in strategies and/or action plans associated with international conventions. However, these C&I are rarely included in a national framework, such as the NFP, making it difficult to ensure a coherent national forest strategy. A key challenge is to harmonize different processes and different levels of application, and to maintain reference to and compliance with other C&I processes, while being specific enough to support national acceptance of C&I. It is important to maintain a cross-sectoral view in order to avoid conflicting outcomes of C&I application and interpretation.

One of the critical issues for efficient and comprehensive use of C&I is how to overcome sectoral boundaries to make C&I more effective and useful for a broader audience or decision-making community. Forestry C&I have often been too specific and technical to server broader understanding or have failed to comply with other statistics in terms of definitions and data design. It will be important to seek cross-sectoral indicator partnerships to harmonize C&I along the gradients of land use and natural resource use. The harmonization issue may be particularly important to avoid costs and frustrations associated with multiple reporting duties (e.g. the parallel efforts in climate change mitigation, which cause inconsistent, siloed assessments). It is important at least to connect NFPs and C&I employed for these overlapping issues, and to secure common platforms for C&I on institutional and organizational levels.

Another challenge is the array of international institutions reporting forest-related data, such as forest area. Even within the UN, several organizations report the same information. For example, the United Nations Statistics Division draws information from FAO (FAOSTAT database), the United Nations Environment Programme (UNEP) (GEO Data Portal), the World Bank (environmental data) and the World Resources Institute (forest datasets). Tables and charts are prepared and presented in FAO's FRA reporting, the UNEP Live portal and the Organisation for Economic Co-operation and Development (OECD) *State of the Environment: Forests* report. Agreement on a common reporting framework among global organizations would help to simplify reporting, reduce duplication and confusion, and lower the costs to countries for monitoring and evaluation.

In most countries, forestry and other public agencies, research centres and universities have land-use information systems that reference forests. The use of different methods, definitions, scopes and data sources among different agencies may produce inconsistent or even contradictory figures on forest area, forest conditions and other forest attributes. FAO's FRA process has provided good leadership in resolving definition issues (FAO, 2010a). Improving consistency is particularly important. To this end the forest monitoring community has done a great deal of research on standardization and harmonization of definitions and approaches (Arnold, Rametsteiner and Kleinn, 2014).

Different interpretation of terms and of data also presents a challenge. One at least partial solution would be a dedicated or specialized body to collect and analyse the information required. In this situation the partnerships of countries in various C&I processes can create leverage to increase consistency. For example, Canada and Australia have made clear to various global reporting organizations that they will only report information according to Montréal Process C&I terms and definitions, and the other Montréal Process countries have followed their lead. This leaves other organizations with the choice of either changing their definitions to conform to the MPWG C&I definitions or to accept inconsistent information from countries that, taken together, have 90 percent of the world's temperate and boreal forests.

B2 – A minimal number of vital indicators should be developed at each level in the results chain

Large sets of indicators are burdensome and costly to track. It will never be possible to monitor every piece of work accomplished or every step that contributes to an output – nor is it recommended to do so, because funding, action and attention are easier to obtain for a small set of indicators than for a larger set.

Quality of C&I sets is more important than quantity, and more is not necessarily better. In other words, a minimal number of the most vital indicators should be selected, with the priority placed on those that can provide the necessary data for evidence-based decision-making in a technically feasible and cost-effective way. Prioritization is imperative; it is important to be tough and persistent in choosing only the minimal number required to measure the results/criteria and to provide meaningful, strategic information. Some of these essential few may be technically important, while others may be politically, economically or socially important.

There is no correct number of indicators to assign per criterion, but the following questions could help guide decision-making about prioritization: How will this indicator help with monitoring, management and evaluation? Is this indicator absolutely necessary to measure whether progress towards the desired result is being achieved? Is it a good measure of the overall likelihood of achieving the desired result? To what extent will maintaining the indicator create additional burdens for respondents or data collectors and processors? If the burden is too great, are there any alternative indicators or proxies that could provide adequate information in lieu of this indicator?

Although simplification should sometimes be encouraged, it should not be at the expense of scientific and methodological soundness. One simplification could be to have C&I sets for different users, with fewer indicators addressing relevant key issues of the output or outcome. To identify the best indicators, it is necessary to consider their reliability, validity and credibility; the cost of collecting and processing the data; and whether they are directly linked to the result in question. Furthermore, if the means of verification for the indicators are too burdensome and not realistic to use, a different indicator should be selected.

Race car computers process thousands of pieces of information per second, yet the driver only looks at five or six gauges intermittently while racing around the track. Similarly, an indicator should be a "dashboard" measure or a waving flag designed to highlight and attract attention when conditions are shifting. The indicator does not need to provide the ultimate detailed explanation of why a shift in conditions is occurring. Rather, it should signal when more intensive, focused and detailed monitoring is needed to create deeper understanding about the causes and effects of the observed shift. Therefore,

the best and most cost-effective approach is often to choose the single most indicative indicator of the ultimate outcome or impact of a sequence of connected links. Choosing an indicator for its ability to wave a flag depends, of course, on having an adequate scientific understanding of the causal links in the sequence and their reliability in predicting the outcomes and impacts from a sequence of effects.

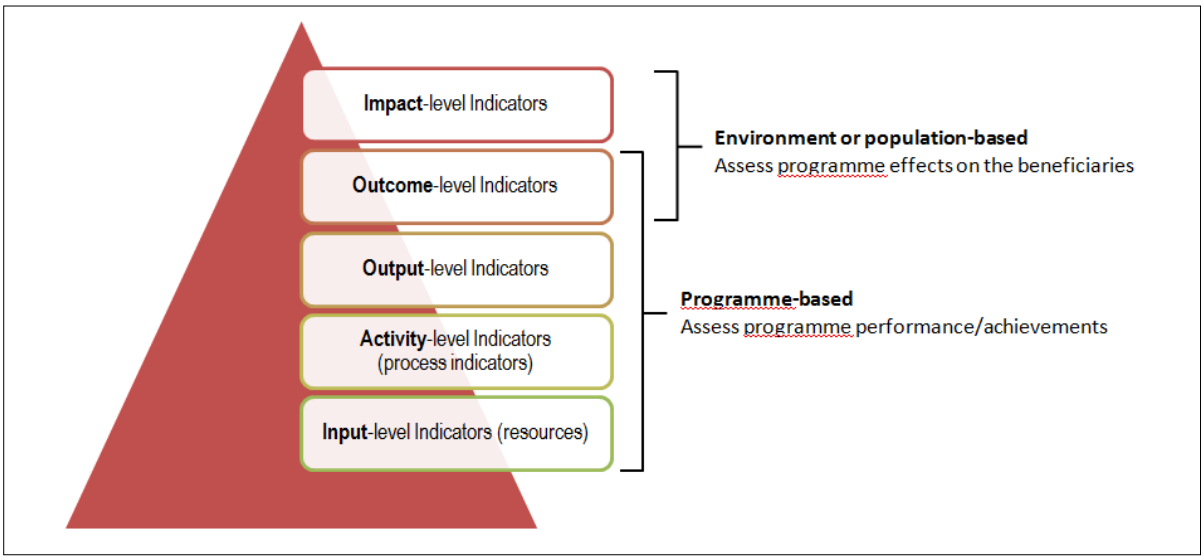
As explained in Chapter 2, the desired results should be identified and articulated within a clear results chain that features logical cause-and-effect relationships between the different levels of results. The agreed results chain should be based on a solid, credible theory of change, whereby attainment of each lower level leads to achievement of the subsequent level. To determine if all criteria for success have been met (i.e. to assess the attainment of the desired results), indicators should be developed at all levels of the results chain, i.e. from outputs to outcome(s) to impact. This is a key challenge; a common weakness in many existing C&I sets is that they mainly pertain to activities and, to a certain extent, outputs. In order to maintain a strong results focus, it is critical that C&I also enable measurement of higher-level results, i.e. outcomes and impact. Research suggests that focusing on and building consensus about outcomes during public engagement has been more helpful in the long run than a focus on increasing, decreasing or changing outputs (Moore, 1998), mainly because outputs typically represent deliverables from a specific programme or partner(s), and therefore participants will each view the outputs through their own filters.

While the logical cause-and-effect relationships between different levels of results may be clear to those leading the development and discussion of potential indicators, having them clearly in mind is not enough for participatory engagement and transparency to stakeholders. The relationships and linkages should be put in writing and made publicly available in information materials or websites. The Montréal Process countries have documented their thinking in booklet form (MPWG, 2009b) and have issued several revisions of the booklet as their collective thinking has evolved. In the booklet, each criterion has a chapeau introducing why the criterion is important, and the discussion of each indicator begins with a rationale statement. The chapeaus and rationale statements create the logical linkages between what is measured and the effects in terms of changes to the values inherent in the criterion statement. In the experience of member countries, these statements are among the most important pieces of information for high-level decision makers who may question why a particular indicator is important enough for investing scarce money and people in monitoring it. The openness and transparency of simple descriptions emphasize why monitoring is an important component of RBM.

RBM standards also stipulate that C&I sets should contain a variety of different kinds of indicators at all levels and thematic areas in the results chain. The higher in the results chain, the fewer data are generally available or needed for strategic-level decision-making and planning (Figure 9). Budget managers and implementers may be inclined to collect extensive information on resources and process indicators. However, senior managers, policy-makers and donors are more interested in a select, strategic set of performance indicators which track changes at the output, outcome and impact levels; they may see a large quantity of lower-level information is irrelevant and wasteful, and this may erode their support for SFM.

Creating process indicators for activities is less important because they track inputs rather than results, yet some countries may want to include them as a way to ensure that implementation of action plans or workplans is on track. The C&I set shown in Table 8, for example, only included indicators from activity to outcome level; the last line in the table has been added to show how the set can be improved by specifying an indicator at the impact level.

Figure 9. Levels of indicators



Source: Kimberly Ross Kane, FAO.

Table 8. Examples of a results chain for improving water quality

Level in the results chain	Criterion	Indicator
Input indicator	Provide seedlings for reforestation	Number of seedlings provided for reforestation
Output	Reforestation in degraded lands	Hectares planted or reforested
Outcome 1	Reduced soil losses in degraded lands	Tonnes per hectare per year of sediment losses
Outcome 2	Reduced sedimentation in rivers	Tonnes per year of sediments in the river
Impact	Improved water quality due to sediment reduction	Mg per litre of suspended particles

Source: Based on TNC (2012).

As shown in the example from Nigeria's NBSAP in Box 24, indicators at the activity and output levels focus on progress of implementation and efficiency, while indicators at the outcome and impact levels are concerned with the higher-level, sustainable effects of the interventions. In this example activities are called "actions" and outcomes/impact "targets"; the term "impact indicator" is used for indicators corresponding to high-level results and "performance indicator" for activity indicators. Typically, the term "performance indicator" or "key performance indicator" is applicable at all levels, and "process indicator" is used to refer to activity-level indicators. An ideal example would include four levels of indicators, pertaining to: actions/activities; outputs/deliverables; outcomes/objectives; and impact/goal. This example thus also reveals the need for a broader understanding and application of common RBM and M&E terms.

At the impact level, the focus should be kept on the forest sector. Globally and even nationally, many impact indicators go beyond forestry to describe the overall context or broader development goals. These should not be the top priority for an NFP, because they depend on history, climate or other parts of the society or economy on which forests do not have direct impact. The share of forests in GDP, for example, is predominantly determined by the size and success of the rest of the economy, not by forestry itself. When target values are defined in the indicators, it is important to focus on changes that can reasonably be achieved in the time scale of the NFP. The scope of the programme and the criteria determine the time frame for realistic achievement of the desired results.

In the example from the Central African Forests Commission (COMIFAC) in Box 25, for example, the strategic objective represents the desired impact, the operational objectives represent the intended

outcomes, and the expected results are the outputs. While COMIFAC has developed an indicator at the impact level, this framework is missing the indicators at outcome and output levels. Normally, the various criteria (outputs, outcomes, impact) would be listed in the column to the left, with the indicators listed in the column to the right.

Box 24. Indicators in Nigeria's National Biodiversity Strategy and Action Plan

Nigeria's NBSAP is the principal instrument for implementing the CBD at the national level. Nigeria signed CBD in 1992 and ratified it in 1994. The second NBSAP (2016–2020) is closely aligned to the CBD Strategic Plan for Biodiversity 2011–2020 and its Aichi Biodiversity Targets and to Nigeria's unique priorities and features. It includes 14 national targets and 67 actions. Indicators are identified for each national target and action:

- 123 performance indicators are used to monitor actions (short-term results);
- 21 impact indicators are used to monitor targets (long-term results).

Examples are shown in Table 9.

Table 9. Example of indicators at the activity (action) and outcome/impact (target) levels from Nigeria's NBSAP

Target	**Impact indicator**
Target 1. By 2020, 30% of Nigeria's population is aware of the importance of biodiversity to the ecology and economy of the country.	% of the population aware of the importance of biodiversity
Actions	**Performance indicator**
1.1. Conduct outreach and awareness campaigns (radio, jingles, etc.), information sharing and public discussions on Nigeria's biodiversity and its significance to ecology, economy, life and services, with specific emphasis on indigenous and local communities.	1.1.1. Number of outreach and awareness campaigns
	1.1.2. Number of public discussions
	1.1.3. Number of states in Nigeria with outreach activities
	1.1.4. Number of radio jingles aired
	1.1.5. Number of advertisements in television and newspapers
1.2. Produce and distribute publications in appropriate local languages and dialects on biodiversity and ecosystem services for the public, especially women and youth.	1.2.1. Number of publications produced and number of copies distributed
	1.2.2. Number of local languages and dialects covered by outreach publications

Source: Federal Republic of Nigeria (2015), Onyekuru (2015).

Box 25. COMIFAC Convergence Plan 2015–2025

COMIFAC is an intergovernmental organization established in March 1999 to give a regional dimension to the conservation and sustainable management of Central African forest ecosystems. It adopted its first Convergence Plan in February 2005. The present Convergence Plan 2015–2025 establishes impact indicators for strategic objectives (long-term results) and expected results for operational objectives (short- and medium-term results). An example is given in Table 10.

Table 10. C&I for COMIFAC's Priority Area 1: Harmonization of Forest and Environmental Policies

Impact (long-term result)	**Strategic Objective 1.1**: Update, harmonize and implement forest and environmental policies	**Impact Indicator 1.1**: By 2025, all countries in Central Africa have forest and environmental policies and legislations, and appropriate institutional frameworks, coherent with the sectoral policies and incorporating the COMIFAC guidelines and regional and international agreements
Outcomes and outputs (short- to medium-term results)	**Operational objective 1.1.2:** Strengthen and harmonize policies, institutional frameworks and national legislation	**Expected results:** National policies and legislation incorporating the rapid changes in the forest and environment sector are revised in a concerted manner in all the countries of Central Africa National programmes and projects integrating the orientations of the Convergence Plan and international and regional agreements are developed and implemented

Source: COMIFAC (2015).

Measuring indicators at different levels of results can be challenging, as the above examples demonstrate. Incomplete understanding of the results chain may lead to omission of indicators at certain levels or a weak theory of change. Above all, clarity must be maintained by having only a few (and SMART) indicators. Many countries might find their C&I ineffective in measuring the effects of policy, and this might be because they have not proposed indicators at the outcome or impact level or do not have a theory of change that is clearly documented or based on a solid logic model with tested assumptions. Indicators at the higher levels are generally more demanding in terms of the time and resources required to collect the data for measuring them.

Some stakeholders are reticent to propose outcome and impact indicators because they are concerned about being held accountable for achieving results that are beyond their full control. The concept of attribution (further discussed in Annex 5), however, recognizes that the higher in the results chain, the less control the programme has over the results. Impact is never directly achieved by a single NFP or project – rather it is a longer-term result to which many initiatives contribute; therefore a single stakeholder cannot be accountable for it. Activities are the only level for which a stakeholder is fully accountable. However, roles and responsibilities are also tied to delivery of outputs.

Although the NFP's implementers or programme managers may not be fully accountable for achieving a desired future condition, research may be available to explain the relative influences of driving forces or other mechanisms outside the forest sector on indicators for NFPs. For example, trends in automobile fuel costs may affect visitation rates at distant forest recreation areas (rising fuel costs reducing visitation or falling fuel costs boosting visitation). Understanding the link between fuel prices and visitation rates may help in interpreting changes in observed visitation rates at the local forest level. If so, then monitoring the changes in driving forces or other mechanisms may provide helpful signals for interpreting the changes observed outside the forest sector. The broader context provided by driving forces should be part of the "story-telling" about what the observed changes mean for ecosystems, economies and society.

It is important to monitor activities and outputs in order to ensure that programmes of work are being implemented and are delivering what was promised. The purpose for assessing outcome and impact is to ensure that the programmes are having the desired medium- and longer-term effects for which they were designed; this is less a question of accountability and more a question of goodwill and intent to make a difference for the well-being of the country, its people and the environment.

B3 – Results-oriented budgeting can encourage a focus on performance and ensure that resources are adequately allocated to achieve desired outputs

Results-oriented budgeting (also known by other terms, including performance-based financing, results-based budgeting and budgeting by results) is a strategy for optimizing management and performance by allocating resources based on results. With regards to the public sector, these results represent a prioritization of public policy choices and should match the expectations of citizens. The main strength of a results-oriented budget is that it is based on the realization of outputs and not just on inputs (i.e. spending that is not necessarily accompanied by any palpable results). This approach is predicated on evaluating not only what has been spent, but also what results have been attained.

Despite the potential benefits of results-based budgeting, it is not widely practised in the forest sector. The lack of good examples of SFM-related results-based budgets illustrates just how challenging it can be and the absence of agreement on standard definitions and models. The budget for Cambodia's NFP 2010–2020 breaks down the costs by subprogramme over five-year periods (Table 11), yet a true results-based budget would actually allocate costs by activity and by output within each programme or subprogramme.

Table 11. Cambodia's NFP budget by subprogramme

Subprogramme	Proposed budget 2010–2014 *('000 US$)*	Estimated budget 2015–2020 *('000 US$)*	Justification
1.1 – Forest Demarcation and Registration	$2 340	$5 774	2 000 km to be demarcated annually at a price, based on initial pilot demarcation work, of up to US$500 per kilometre, and when reduced by 30% due to gained efficiency and experience, approximately US$350 per kilometre. NB: Outsourcing with competitive bidding of elements of the demarcation and classification work is an obvious option for cost-cutting.
1.2 – National Forest Classification	$443	$443	More than 8 million hectares are not classified. The cost is estimated up to US$1 per hectare. It is suggested that classification should be undertaken on a pragmatic basis, where needed, and at a speed that matches other operations.
Total Programme 1, Forest Demarcation, Classification and Registration	**$2 783**	**$6 217**	

Source: Kingdom of Cambodia (2010).

While Bangladesh is not yet conducting full results-based budgeting in the forest sector, it is taking steps to link budgeting to results (Box 26).

Perrin (2002) summarized results-based budgeting experiences for 27 countries attending an OECD-sponsored workshop. The following five key needs were identified.

- A focus on outcomes is very important, but also very difficult.
- Attention to data quality is needed, to ensure that performance data are meaningful and valued.
- Creation of a results-oriented culture throughout government is essential for implementation of a results-oriented approach.
- Leadership and support from the top levels of government are needed to bring about a results-focused approach.
- A strategic rather than a piecemeal approach is necessary.

While data quality and the importance of an outcome-based focus have been stressed throughout this paper, the other three points deserve further comment. Decisive actions by top-level government officials are essential for implementing a results-oriented culture throughout government. In most governments where leadership is divided between an executive branch (e.g. Prime Minister, Premier or President and this individual's supporting agencies and staff) and a legislative branch (e.g. Parliament, Congress), both branches of the government must agree –in both principle and practice – to implementing a results-oriented culture. Where the executive branch issues an order to subsidiary agencies to use RBM, but the legislative branch does not appropriate money in sufficient amounts to track performance, the approach fails. Sometimes, when legislators have the prerogative to appropriate specific amounts of money for specific projects in the districts that they represent, it is exceptionally difficult to create a government-wide results-based culture because the earmarking of money for specific projects based on political interests runs counter to the results-based culture. If a single sector or agency (such as the forest sector or the forest management agency) attempts to implement a performance-based, results-oriented culture, the support of the chief executive and the legislature is still required, along with the concurrence of the provincial or subnational components of the agency which will receive funds to perform the results-oriented management activities outlined in the national forest plan. The challenge is not simpler or easier simply because it only involves a single sector or agency or plan.

Box 26. Bangladesh Country Investment Plan aligned to the results framework for Environment, Forestry and Climate Change

Bangladesh is finalizing a five-year Country Investment Plan (CIP), which serves as the country's single strategic plan for the Environment, Forestry and Climate Change sector. As an integrated programmatic, results and financing framework, the CIP helps the government translate policies and sectoral plans into cross-sectoral prioritized investment areas that contribute to a clear results chain (Figure 10).

The Environment, Forestry and Climate Change CIP has found inspiration from another cross-sectoral CIP designed to improve strategic investments in agriculture, food security and nutrition. This latter plan, developed with the support of FAO in 2011 and monitored since then, has contributed greatly to improved investment coordination and resource mobilization in these sectors.

In the investment framework, projects feed into subprogrammes, which in turn contribute to programmes, which are then grouped into pillars. Each pillar, programme and subprogramme has defined expected outcomes and outputs, all of which contribute to a common goal (Figure 11). The budgets, developed through a costing exercise, are compared to a map of existing projects, so that financing gaps (investment needs exceeding existing investments) can be calculated.

By tagging funding to specific subprogrammes and programmes, the CIP facilitates:

- investment in priority activities that produce results;
- coordination of human and financial resources (i.e. stakeholders and funds);
- monitoring and reporting on implementation and results, which informs adjustments to plans and their implementation (Figure 12).

It has been formally recommended that a CIP Monitoring and Coordinating Unit be created as a permanent technical structure within the Ministry of Environment and Forests. The unit will be tasked with the role of coordinating and monitoring investments, as well as their impacts, and prioritizing future investment needs. The CIP will help Bangladeshi agencies prepare better projects by clarifying who needs to do what, what targets are to be achieved and what the investment priorities are – questions that are particularly important to Bangladesh as it seeks to address significant climate change challenges, to implement ambitious commitments made to UNFCCC and to report on progress towards the SDGs. The CIP for Environment, Forestry and Climate Change will be implemented between 2016 and 2021.

Figure 10. Integrated results and financing framework for the Country Investment Plan

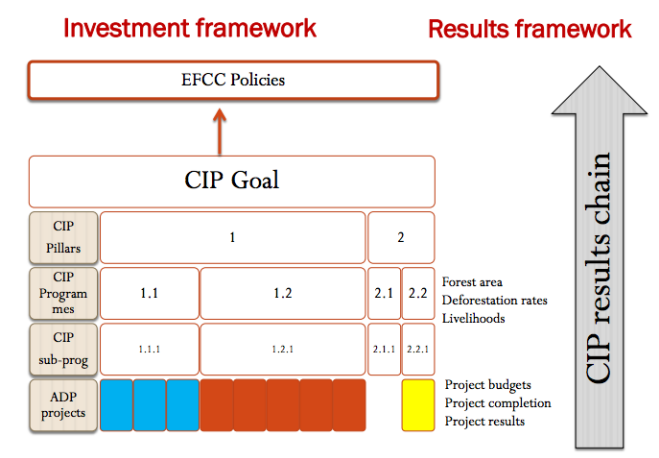


Figure 11. Pillar, programme and subprogramme contribute to a common goal

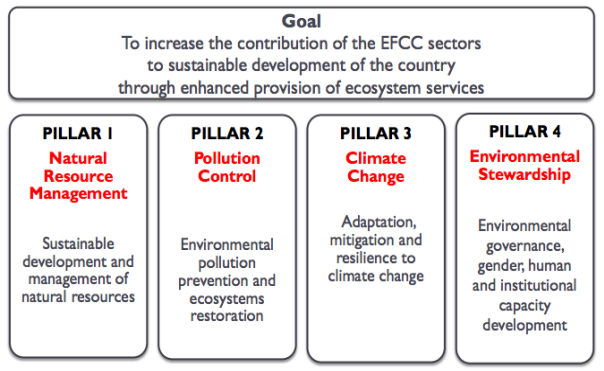
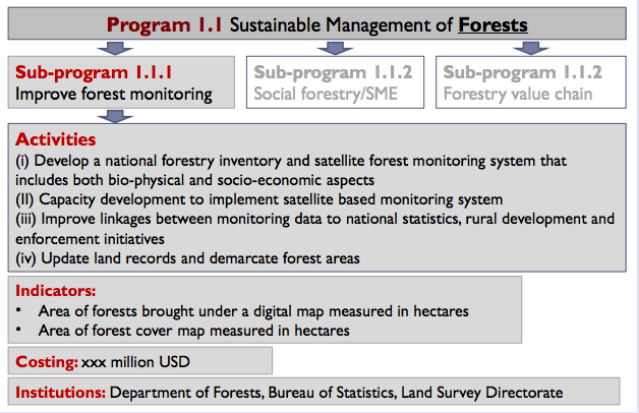


Figure 12. Subprogramme indicators and budget details



Source: Ministry of Environment and Forest, Government of Bangladesh and FAO (2016).

Despite these difficulties, there is still merit in creating a results-oriented culture in the forest sector for the NFP and its activities. Clear demonstration that the results sought in the NFP are being achieved, as evidenced by outcome-based performance data, can have impact on the budget deliberations of both executive and legislative branches of government and build support for the forest sector, the NFP's strategic goals and NFP actors. Transparency and accountability regarding how money entrusted to an agency was spent and the outcomes achieved are critical components of good governance, whether a complete results-oriented culture is in place throughout the government or not. Finally, outcome-based performance information about forest inventory and monitoring activities is a critical tool for building solid, long-term support for monitoring programmes and C&I. So, while it may not be possible to meet the five key needs of results-based budgeting on a government-wide basis, much can be done within the forest sector and by NFP actors to create and promote a results-based culture through effective inventory and monitoring activities.

5. Monitoring, evaluation and learning phase

Monitoring, evaluation and learning (MEL) refers to the actual application of C&I, involving the processes of collecting, analysing, reporting and using data to adjust programmes. C&I are measured and the resulting findings are interpreted at various levels. MEL should result in evidence-based decision-making about needed adjustments to policy and programming as well as documentation of key lessons learned and practices to be applied to future interventions. It may also provide ideas for further modifying or enhancing internal RBM systems and/or the C&I themselves.

MEL is an indispensable management tool for improving current and future programme planning, implementation and decision-making. C&I are the foundation of MEL, as they lay out a structure and system for learning lessons and making continuous improvements. More specifically, they set forth what needs to be tracked and how it should be measured, thus enabling a programme team to determine – in an objective and consistent way – the extent to which activities have been conducted and results have been achieved. Sets of C&I are mainly developed for the national level to describe and monitor status and trends in forests and forest management. Results frameworks containing C&I can help to organize and transmit existing information, identify gaps in knowledge and structure the gathering of new information to feed back into forest management frameworks.

C1 – C&I are only as good as their data collection and management systems

The value of the information collected through C&I will lie in the quality of the data sources and in the way the data are analysed. Data collection and analysis methods have to be consistent to ensure the comparability of data over time and across the landscape. The forest sector faces increasingly diverse information needs on forest and land use, but many countries have limited capacity to collect, compile and analyse forest-related data and to generate and disseminate information and knowledge tailored to the target audience. In 2010, only 45 countries worldwide were able to assess changes in forest area and characteristics through consecutive systematic national forest inventories (FAO, 2010a).

Available data for indicators take on their full meaning when multi-year series are available. A multi-year vision makes it possible to identify trends, analyse causes and influences, and measure whether a strategy is efficient in the long term. This means that C&I should be defined consistently and should remain stable; if they are changed too often, then trends cannot be assessed over time and past and present performance cannot be compared (Box 27).

Similarly, changing protocols between two inventories will reduce comparability unless "backcasting" is used. Backcasting refers to the process of re-estimating previously reported inventory or monitoring information to make the older information more directly comparable to current information. For example, if new or improved woody biomass volume estimation equations are adopted, using the new equations to re-estimate volume estimates reported 5, 10, 15, and 20 years ago will help improve comparability and sustain trend estimates. Backcasting is common in global reporting of greenhouse gas emissions and carbon sequestration by forests, as the science of estimating these has grown over the past 20 years.

Box 27. Austria's progress in developing C&I within the NFP

In Austria, the C&I development process within the NFP started in 2004. Since then, the indicator set has been consolidated towards a set of 62 indicators for which quantitative data are available for different time steps. These time steps vary according to availability of official statistics (e.g. annually), forest inventory data (approximately every ten years) or outputs of research results (irregular). For each indicator, a target value was introduced to be benchmarked against development over time. For each indicator, a traffic-light system evaluates the progress in comparison to a reference year. The indicators serve as a controlling instrument in the NFP and are used as a conceptual backbone of the Austrian forest report (every three to five years). Two major challenges have been identified: some indicators lack accurate current data and are thus difficult to benchmark against, and some indicators are completely insensitive to any change. A planned revision of the assessment will focus on key indicators that are powerful in assessing and communicating progress or lack of progress.

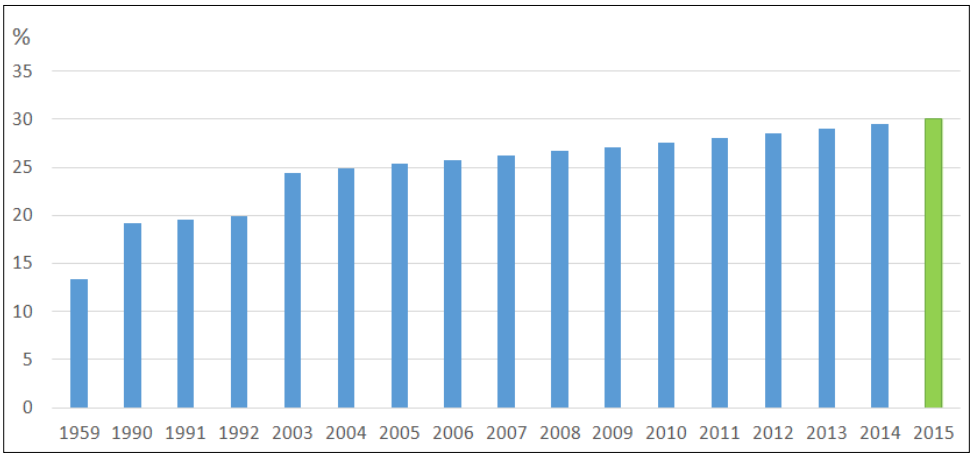
Source: Republic of Austria (2015).

Using one data collection protocol in one part of a country and a different protocol in another part of the country also reduces data comparability.

An M&E system can allow the flexibility to modify or add indicators during implementation as data capacity increases and new data elements become available. However, it is important that indicators not be changed often, because this would prevent their use to trace progress or observe trends over time. Cuba, for instance, made a commitment at UNCED in 1992 to increase forest area to 29.3 percent in 2015, from 13.4 percent in 1959. The consistent monitoring of the forest area indicator over many years (Figure 13) made it possible to assess progress towards this political goal over time (Herrero Echevarría, 2015).

The LANDSAT land cover monitoring project is another example of monitoring design showing a sustained time series of consistent information for global environmental monitoring and reporting (Box 28).

Figure 13. Forest area as % of land area in Cuba, 1959 to 2015



Source: World Bank (2016).

Box 28. LANDSAT Data Continuity Mission: ensuring continuity of time series for global environmental monitoring and reporting

In the mid-1960s, stimulated by success in planetary exploration using unpiloted remote sensing satellites, the United States Department of the Interior, the National Aeronautics and Space Administration (NASA) and the Department of Agriculture embarked on an ambitious effort to develop and launch the first civilian Earth observation satellite. This goal was achieved on 23 July 1972 with the launch of the Earth Resources Technology Satellite (ERTS-1), which was later renamed LANDSAT 1. LANDSAT 2, 3 and 4 followed, launchedin 1975, 1978 and 1982, respectively. The Thematic Mapper (TM) sensor first contained on LANDSAT 4 has proven useful for monitoring forest land cover.

Successive LANDSAT missions 5, 6 and 7 also contained the TM sensor. When LANDSAT 5 launched in 1984, no one could have predicted that the satellite would continue to deliver high-quality global data of Earth's land surfaces for 28 years and 10 months, officially setting a new Guinness World Record for "longest-operating Earth observation satellite". LANDSAT 6 failed to achieve orbit in 1993. LANDSAT 7 successfully launched in 1999, but in 2003 experienced a permanent mechanical failure of the Scan Line Corrector, which reduced the usefulness of individual LANDSAT 7 scenes. This technical problem, combined with the failure of LANDSAT 6 to achieve its orbit, made it important to develop a replacement LANDSAT satellite much earlier than planned – the LANDSAT Data Continuity Mission.

The LANDSAT Data Continuity Mission was launched on 11 February 2013, a month after the demise of LANDSAT 5. Renamed LANDSAT 8 after launch, this mission introduced an Enhanced TM sensor (ETM+). LANDSAT 8 continues to provide daily global data and extends the more than 40-year LANDSAT data archive with images sufficiently consistent with data from the earlier missions to allow long-term studies of regional and global land cover change. The value of this long-term, consistent archive of land cover information was enhanced further in January 2009 when the entire LANDSAT data archive was made available free-of-charge to the public around the world. The result of this policy change was a 60-fold increase in imagery downloads from the LANDSAT archive. LANDSAT 9 is tentatively planned to launch in 2023 and will continue this long-term scientific mission vital to global land cover monitoring.

Source: NASA (2016a,b).

The frequency of monitoring and inventory activities and the regularity of reporting are important. While issuing fresh reports each year can be important to maintain the interest of stakeholders inside and outside government, the cost of collecting fresh data each year over the entire country or for the entire C&I set is often prohibitive. It would be better to discuss with stakeholders during the initial strategic design phase how often data need to be collected or refreshed to document changes over time and identify trends (Box 29).

Beyond the quality, reliability and consistency of data over time, effective and useful analysis and interpretation of data also depend on the analytical capacity of forest administrations. Furthermore, clear definition of the C&I from the outset is necessary for their accurate and consistent interpretation (Box 30).

Box 29. Frequency of forest monitoring and reporting in the United States of America

In the United States of America's experience, a ten-year measurement cycle meets stakeholders' needs in the western part of the country, while a five-year cycle makes more sense in the more humid eastern half of the country, where forests grow faster and are more intensively managed to support the wood products industry. Twenty percent of the plots in eastern states are measured annually, versus 10 percent of the plots in western states. While the inventory programme can issue a fresh report every year, state-level statistics are based on a so-called "rolling average" of the data for the past five years in the east and the past ten years in the west. Every five years, an eastern state gets a detailed state report reflecting the most recent five years of data and trend analyses looking back 30 to 50 years. Seven of the 35 eastern states get one of these detailed reports each year. Western states get these reports every decade – two or three states each year. This approach balances the workload in an efficient way and keeps costs down. Every five years, national-level statistics are estimated for FRA reporting purposes. So each year, something new is reported somewhere, which maintains public interest without the need to redo the whole inventory every year.

This cycling of reports also addresses the key issue of statistical uncertainty. Each statistical estimate has a confidence interval around it. Making trend analyses based on annual data gets confusing when analysts have to try to make sense of small changes in the annual mean estimates that are simply fluctuations within the confidence intervals of those estimates. Persons without a background in statistics and biometrics may not understand. Issuing major reports once every five to ten years, depending on local conditions, may help sort out actual changes from fluctuations in standard errors of the estimates.

Source: R. Guldin (personal communication), USFS (2015b).

Box 30. Use of C&I for SFM to structure the systematic collection of data: experiences and challenges of the Association of South East Asian Nations

The Association of South East Asian Nations (ASEAN) Secretariat developed a Monitoring, Assessment and Reporting (MAR) Format based on the ASEAN C&I, to structure the systematic collection of data and information pertaining to SFM from each ASEAN Member State. The format was developed for use both online and offline. ASEAN Member States have agreed to provide updates to the online MAR Format on a biennial basis. This will allow the ASEAN Secretariat to produce periodic synthesis reports on the status of forest cover, management and conservation, the development of forest resources and the progress in achieving SFM at the ASEAN level.

In implementing the MAR Format, especially its online component, the ASEAN Secretariat has encountered several challenges, including among others:

- different interpretations of some of the terms used in the format by individual Member States;
- lack of inter- and intra-agency collaboration for data collection;
- inadequate or unreliable temporal and spatial data and information;
- failure to integrate the implementation of the MAR Format in existing forestry platforms in Member States or in other programmes relevant to forests;
- lack of a dedicated or specialized body for collection of the structured information required by the MAR Format in each ASEAN Member State;
- limited human and financial resources;
- lack of awareness and capacity among the stakeholders involved in data collection;
- inadequate identification of indicators that were not relevant at the national and forest management unit levels in individual ASEAN countries.

Source: Thang (2015).

In Europe, the introduction and further development of C&I has had positive effects on the shape of monitoring instruments. It has resulted in harmonized activities during inventory design, improved comparability and standardization of data collection and an increase in forestry statistics. Overall, C&I have served as a reference for further adaptation of monitoring instruments both in practical and methodological terms. The most evident problem in relation to monitoring of C&I has been maintaining resources and capacities. In times of financial crisis in many countries (e.g. in Eastern Europe), investment and expertise in monitoring activities are vanishing; inventory periods are becoming longer and data collection is often incomplete. With new reporting areas emerging (e.g. climate change), funding for forest monitoring and reporting is frequently questioned (EFI, 2013). Current considerations focus on generating synergies in data collection and selecting key indicators that would avoid collection of unused or irrelevant data.

C2 – Using C&I for monitoring and reporting in a strategic way can enhance evidence-based decision-making during implementation

If C&I have been consistently defined and data collected regularly, the data gathered should be viable, credible and useful as evidence for decision-making related to ongoing management and implementation as well as future programming and policy work.

Most NFP documents (and multi-year programmes in general) have a specified time span (e.g. five to ten years). The implementation of NFP subprogrammes and related actions are to be reviewed regularly over the course of the programme. Monitoring, review and reporting efforts during the life of the programme typically pertain to activities and results at the output and outcome levels, since they are attainable in the short and medium terms. Only in some cases can changes in impact – which is generally a longer-term result – be noticed during a five- to ten-year programme life. Thus M&E exercises during the life of the programme should generally focus on the degree of input into activities, the degree of progress on activities towards outputs, and to a certain extent, the level of attainment of the outcome(s). Collecting and analysing data from C&I during the course of a programme should lead to minor adjustments and corrective measures in implementation.

Even where federal forest landownership is limited and forest management is the responsibility of subnational governments, a national report – which presents both the national situation and some indicator information disaggregated by provinces and territories – can help citizens and policy-makers at both the national and subnational levels track progress towards SFM (Box 31).

Since monitoring and reporting are carried out on an ongoing basis – and reviews are done periodically – the findings are meant to inform real-time decision-making and feed into implementation. Generally, such results can identify where certain interventions are off track or where certain approaches are not working as expected, thus provoking slight adjustments in programming.

When the information generated from the C&I is presented in an informative, user-friendly and attractive way, policy-makers and managers can more easily digest it and apply it to programme-related decision-making. For instance, Australia has found that the use of C&I in reporting helps to structure the reports in a logical framework (Box 32). Other countries in the Montréal Process have obtained similar benefits from regular reporting using the the process's C&I framework (see Montréal Process, n.d. to view all country reports). The common framework also enabled the Montréal Process to prepare overview reports (MPWG, 2009a) which contain similar indicator information for all the reporting countries.

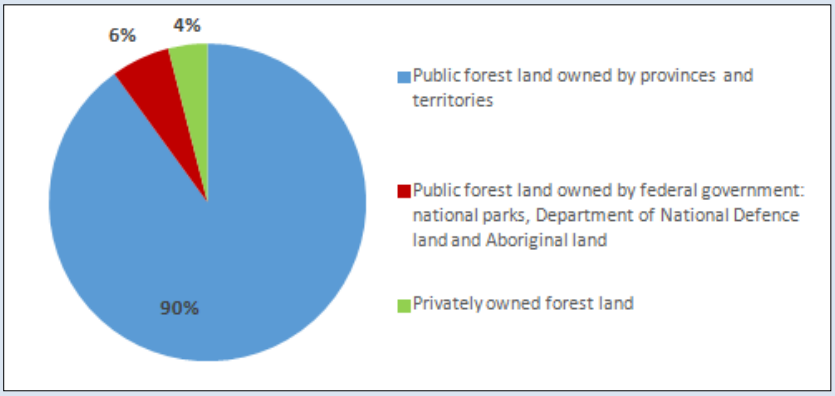
No matter how complex an M&E system or its datasets, it is important to ensure there is a simple "front end" that can be quickly grasped and understood by a broad audience, including decision-makers and funders. For this purpose, open access to information, as well as user-friendly data retrieval and visualization tools, can contribute greatly to the use of C&I data results in forest policy. Indeed, as physicist William Pollard is widely quoted to have said, "Information is a source of learning, but unless it is organized, processed and available to the right people in a format for decision making, it is a burden, not a benefit".

Box 31. Canada's use of C&I to set baselines and track progress towards SFM

For 25 years, the Government of Canada has been using *The State of Canada's Forests reports* – mandated by national legislation – to chronicle Canada's progress towards SFM. This annual report uses C&I as the reporting mechanism. It is the only national snapshot of the social, economic and environmental status of forests and forestry in Canada.

One of the challenges in Canada is that the vast majority of the nation's forests are not federally owned (Figure 14). It is the responsibility of Canadian provinces and territories to develop plans for SFM, in the context of national laws and regulations. The State of Canada's Forests presents both an overview of the national situation and reports on selected indicators by province or territory. Thus, even when subregional political units are largely responsible for achieving SFM within their jurisdictions, a national report with some disaggregated information for local units is highly useful.

Figure 14. Forest landownership in Canada



Source: NRCan (2015).

Box 32. C&I helps improve reporting in Australia

Since joining the Montréal Process, Australia has shifted from fragmented national forest reporting to reporting with a shared understanding of purpose, increased transparency and trust in the processes, and increased capacity-building. Importantly, this shift has led to increased harmonization among Australia's local, regional, national and international reporting.

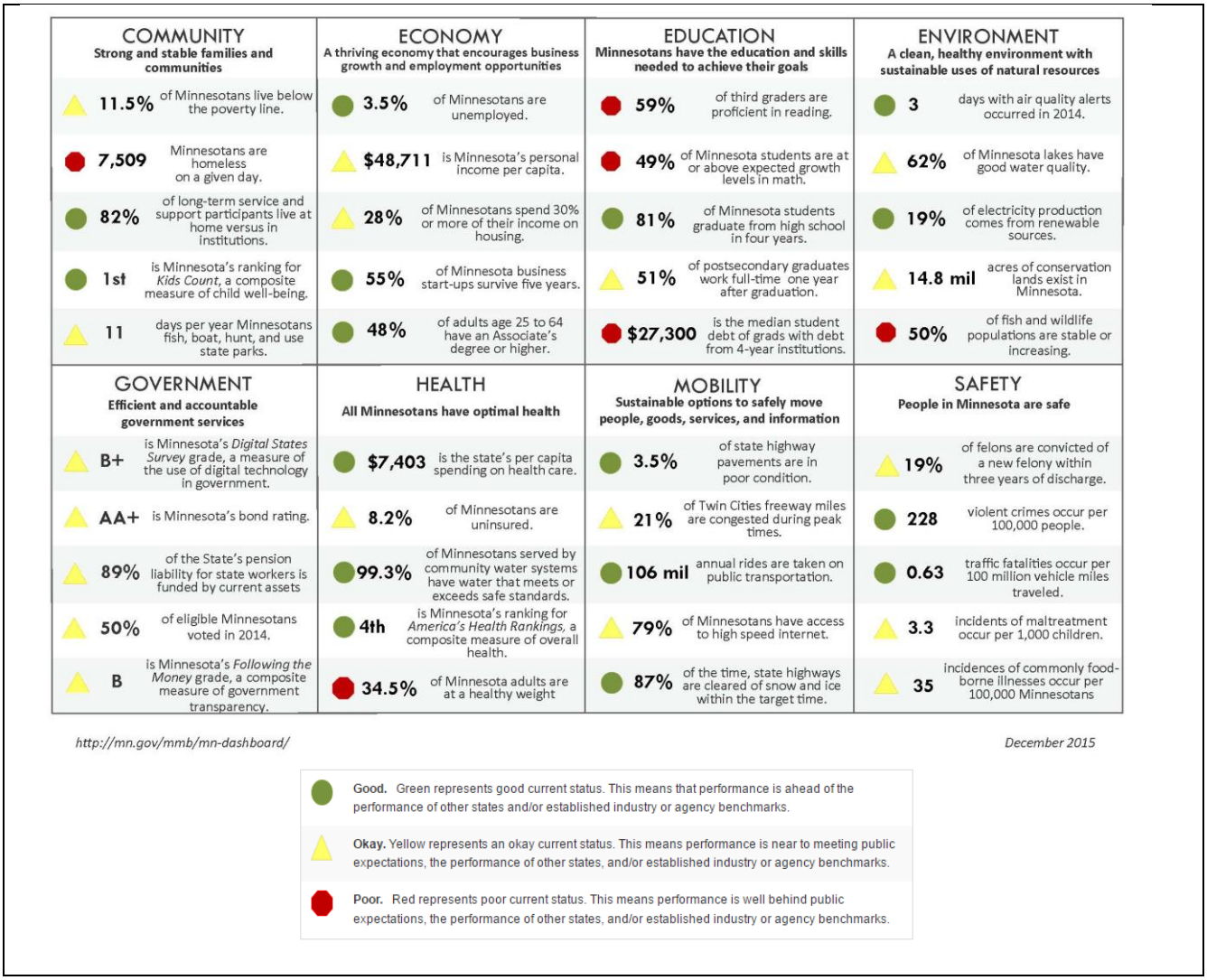
The primary reasons for this change are the adoption of the Montréal Process C&I; the creation of a national consultative forum; the integration of the framework into formal reporting processes; the alignment of Australia's forest certification scheme to the framework; and the ongoing engagement with Montréal Process country members.

Australia's National Forest Policy Statement mandates a review of the state of Australia's forests every five years. Accordingly, the national, state and territory governments jointly publish the series *Australia's State of the Forests Report*. This comprehensive report is explicitly structured using Australia's framework of C&I and addresses the social, economic and ecological aspects of forest management. This approach has led to a consistent, comprehensive series of reports aligned with international reporting and other reporting within Australia.

Source: Howell, Wilson and Butcher (2015).

An innovative tool that facilitates interpretation and application of data is an online dashboard, which compiles data on selected indicators and uses graphs and visuals to present current status and trends. The state of Minnesota in the United States of America – a state with a strong natural resources sector and a diversified economy blending farming, forestry, outdoor recreation, mining and a strong manufacturing sector – uses such a dashboard to report on the status of 40 key indicators as a framework for monitoring the state's socio-economic and environmental progress (Figure 15). This is an efficient way to visualize information quickly for decision-makers. However, if a dashboard is to be useful for decision-makers, the indicators chosen must present information that is critical for influencing the decisions to be made.

Figure 15. Minnesota Dashboard



Source: Minnesota Management and Budget (2016).

Much progress has been made in developing core national indicators in the economic and social arenas, but developing core sets of environmental indicators has been difficult in many countries. An attempt to do so using global data is shown in Box 33.

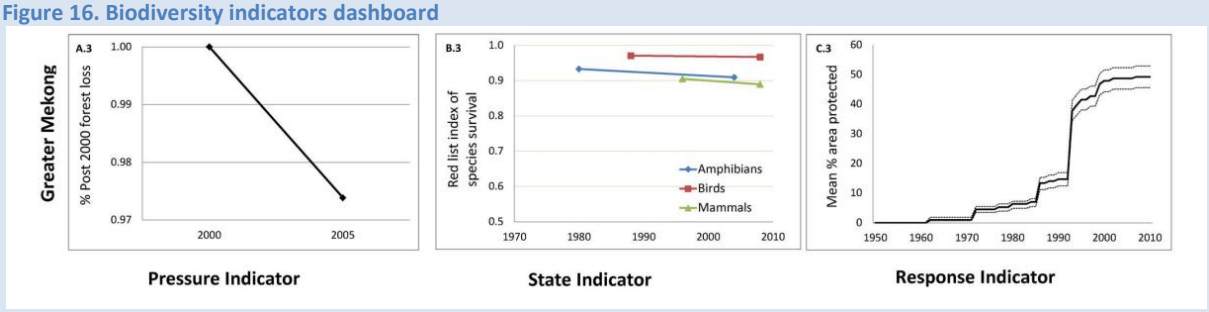
In the United States of America, some 19 different agencies collect and report various types of environmental information with little or no coordination, which leads to some confusion and redundancy (National Academy of Public Administration, 2007; Guldin, 2010). In contrast, the United States Forest Service has provided leadership and built a partnership among national, state and non-governmental organizations for reporting on indicators of forest condition and trends. National assessments of forest conditions and trends are based on the Montréal Process C&I and more detailed statistics reported in five-year cycles (Smith *et al.*, 2009).

During the analysis and reporting phase, the results of monitoring should be converted into messages and stories that are relevant and meaningful for those who drive the related policy processes, to strengthen evidence-based decision-making. As mentioned above, representing the data in an attractive way (e.g. using graphs and diagrams, traffic-light score cards, dashboards) can enhance evidence-based decision-making. A "decision theatre" is an innovative technique for promoting multistakeholder engagement in evidence-based policy-making (Box 34). Decision theatres could include formulation of C&I as a component of programme and policy development.

Box 33. Constructing a biodiversity indicators dashboard using global data

The core elements in the biodiversity indicators dashboard of Han *et al.* (2014) are pressure on biodiversity, its drivers (e.g. habitat destruction, climate change, invasive species), the state of species and ecosystems (e.g. species extinction risk, animal and plant populations, ecosystem integrity), conservation action or policy responses (e.g. protected area establishment and management, investment in biodiversity conservation) and benefit to human well-being from the social, economic and cultural impacts of conservation (e.g. maintenance of hydrological functions, climate change mitigation, maintenance of indigenous cultures). Forest cover loss is shown as the pressure indicator, species extinction risk as the state indicator and protected area coverage as the response indicator (Figure 16). In addition, freshwater provisioning to downstream human populations is used as the benefit indicator.

Figure 16. Biodiversity indicators dashboard



Source: Han *et al.* (2014).

Box 34. Decision theatres – the future of evidence-based policy-making

A decision theatre brings together the benefits of integrated modelling with multistakeholder deliberation. Unlike some visualization labs and flat-wall display facilities, the decision theatre is an immersive environment designed for collaboration. Participants are often arranged in a conference configuration to improve engagement with each other and interaction with the visual information around them. They can take advantage of a variety of tools to improve decision-making including three-dimensional and geospatial visualization, simulation models, system dynamics and computer-assisted tools for collecting participant input and facilitating collaboration.

Decision theaters have been referred to as the future of evidence-based policy-making. Facilities are operating in Canada, China and the United States of America. They are used by federal, state and local government agencies, community planners and policy-makers in business to address complex problems ranging from hypergrowth to water resource management and disease monitoring.

Source*:* Decision Theater Network (n.d.)

C3 – Learning from evidence that C&I generate can lead to improved future programming

Typically a final evaluation examining the higher-level achievements and impacts would be conducted at the end of a multi-year programme in order to assess whether the intended outputs were delivered; the extent to which outcomes were achieved; and what impact was made. The findings should provide information on whether the NFP is oriented in the right direction and what changes or additions might be needed for the next NFP cycle. This exercise may also lead to formulation of recommendations, including advocacy for certain policy reforms.

In this regard, C&I are potentially powerful instruments for influencing future programmes and policies. Indicators provide information on what is (or is not) working and on the extent to which the expected results are being achieved, all of which is valuable information for improving SFM at different levels. In Argentina, for example, data on forestry indicators helped to catalyse legislative reform for the benefit of SFM (Box 35).

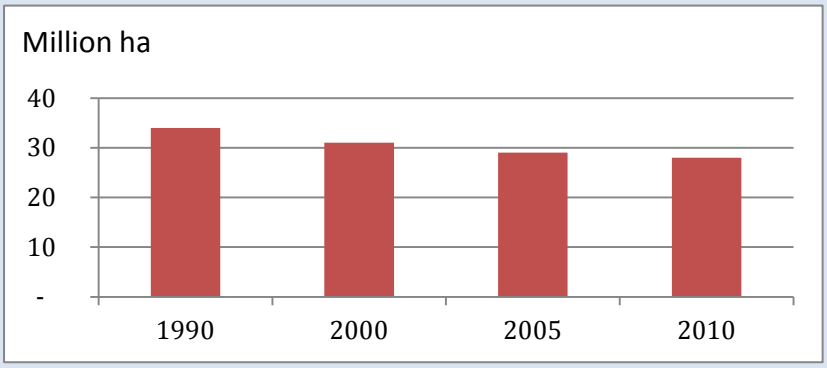
Information use in policy processes is improved by effective communication, meaning comprehensive, timely and transparent information flow and the exchange of knowledge and experience between relevant institutions and participants (Guldin, Parrotta and Hellström, 2005). An example of the benefits flowing from collaboration among actors is given in Box 36, involving actors in the forest and public health sectors.

Box 35. Monitoring of deforestation in Argentina results in a law to protect the environment and promote SFM

In Argentina, investment in infrastructure, technological changes (transgenic and direct seeding) and globalization have led since the 1990s to the advance of the agricultural frontier and a deforestation trend that has transformed the country's native forests (Figure 17). In addition, indigenous people have complained of the erosion of their rights regarding the ancestral lands they occupy and their management of natural resources.

In response to these land use changes, in 2007 the National Congress passed Law No. 26.331 on Minimum Standards for the Environmental Protection of Native Forests to promote enrichment, restoration, conservation, use and management of native forests in a sustainable way. Among other things, the native forests law established a one-year ban on deforestation and required provinces to define those forest areas that would be protected, those designated for sustainable use and those that could be converted to other uses. It also provided for creation of a National Fund for the Enrichment and Conservation of Native Forests to be distributed to the provinces. The law has contributed to a slowdown in the deforestation of native forest in recent years.

Figure 17. Evolution of natural forest cover in Argentina



Source: Malleux (2015).

Box 36. Mexico's policy response to forest inventory results

As an original member of the Montréal Process, Mexico desired to report on forest conditions using the C&I process, but it lacked a national inventory programme for forests. Developing that programme was the first step. When the initial national inventory of Mexican forests was completed in 2007, national forestry officials found that fuelwood provided 80 percent of the energy in rural areas of southern Mexico. Further, when growth and fuelwood harvest trends were projected forward, analysts found that harvests were unsustainable in the long run. This finding triggered additional fact-finding on fuelwood consumption in that region, which revealed that much of the fuelwood was being burned for home heating and cooking on open hearths or primitive "three-stone" grills, both of which were creating a great deal of indoor smoke and fumes. As a result, women and children especially were experiencing high rates of smoke inhalation, leading to asthma and other breathing and lung disorders. Exposure to cooking smoke causes more premature deaths globally than malaria or tuberculosis, to which are added many non-fatal illnesses.

Government officials examined options for addressing the unsustainable fuelwood consumption and the public health risk and chose to begin a programme to promote improved wood stoves. The government bought 600 000 simple yet fuel-efficient wood stoves with chimneys (Photo) and distributed them to families in rural areas having health issues. The target was to complete the acquisition and distribution of the stoves by 2012. As the target was only 72 percent accomplished by the end of that year, implementation continued in 2013.

Simple, fuel-efficient wood stove distributed in Mexico

Each new stove cuts fuelwood consumption 50 percent. When the stove distribution is completed, the total decrease in fuelwood consumption will be sufficient to return harvest to sustainable levels, and the stoves will make a measureable improvement in the health and quality of life of rural families. A number of non-profit humanitarian organizations are now taking part in the programme along with the Mexican government. Similar programmes involving collaboration among public health and humanitarian organizations in Guatemala and elsewhere in Central America illustrate how collaboration across sectors can benefit families, improve public health and promote sustainable forest management.

Source: Lane (2016), Global Alliance for Clean Cookstoves (2012a,b), MPWG (2009a).

Information derived from relevant, scientifically sound and comprehensive data is a critical resource for improving the evidence base and the quality of decision-making in forest policy. Solutions for complex issues in forest conservation and management require specialized information as well as the competency of decision-makers and their staff to integrate such information into decision-making. Although technical information is commonly assumed to be dissociated from politics and to provide a neutral basis on which to make policy choices, in practice data and information are frequently subject to differing or opposing interpretations among stakeholders (Nelkin, 1979). This is normal; indeed such differences are actually a sign of improved governance, as they denote a shift in policy dialogue from a concern with identifying conditions and trends to a concern with what the conditions and trends mean and what shall be done going forward. The importance of this shift should not be discounted. When resource conditions and trends are highly uncertain, as in the absence of relevant, scientifically sound and comprehensive monitoring information, dialogue will tend to remain focused on these issues and little or no progress will be made towards NFP goals. But with solid, credible, comprehensive monitoring information from peer-reviewed inventory and assessment processes, information about current conditions and recent trends will be widely and publicly accepted as accurate and timely. Then the dialogue can shift to the more critical questions about forest governance: what the real conditions mean to different interests, whether desired outcomes are being achieved, and what adaptations are needed, if any, to move more quickly and efficiently towards NFP goals.

6. Conclusions and outlook

Lessons from two decades of experience have shown that C&I and NFPs are both powerful tools and they can reinforce each other. NFPs provide an opportunity to discuss C&I for SFM; and, in turn, the integration of C&I into NFPs can strengthen the NFPs' ability to promote SFM.

Moreover, there is a close relationship between RBM, C&I and NFPs, which are all proven instruments for promoting SFM. While the NFP focuses on the practice of implementing SFM in participatory ways, C&I are a tool for applying RBM at all stages in the programme cycle. As the case studies in this publication have shown, C&I are a critical component of effective M&E systems – yet their use extends beyond M&E. They can be particularly beneficial at the programme/policy design phase as well as in documenting and promoting uptake of lessons and good practices.

Nevertheless, decision-making and policy-making are not always entirely rational and evidence based. A major reason is that governments are political entities, and C&I rarely monitor the give-and-take of politics, especially in democratic governments. Thus C&I-related information can inform policy dialogue but rarely will be the sole type of information that drives policy-making. At best, science and monitoring information can guide development and analysis of feasible policy options. Further clarification is needed on how C&I processes can be harmonized to inform policy better.

The extent to which C&I are currently applied varies across regions, subregions and countries, and there is still some confusion about how best to formulate and use them. They are often seen as a complex tool with little to no added value. Consequently, they have drawn little interest from the main actors that should be using them, notably forest administrations, local communities and economic operators. As a result they attract inadequate funding from national governments, and most efforts to adopt national C&I are primarily supported by international bodies.

To reverse this situation, a number of significant challenges need to be addressed. The seven approaches discussed below, if taken together, will put a country on a solid path towards improved national forest planning and, more importantly, the sustainability of the goods and services that the nation's forests provide to society. These approaches – each requiring some investment of intellect and energy – are: demonstrate and communicate the added value of C&I for SFM; promote leadership and ownership through inclusive participation in NFP and C&I development; provide adequate funding for implementation and M&E of NFPs; simplify and harmonize C&I for SFM; ensure effective and innovative data management; facilitate a cross-sectoral, landscape approach; and reinforce capacity-building and feedback.

The way forward to strengthen the use of C&I in NFP to enhance RBM

Demonstrate and communicate the added value of using C&I for SFM

C&Is are particularly useful for planning and developing guidelines (e.g. legal and regulatory frameworks, standards) and they help to build an atmosphere of trust between governments and the various groups of forest users (private sector and communities). C&I also improve transparency and accountability, and they can enhance communication, capacity-building activities and advocacy work, for example related to climate change and FLEGT. C&I make it possible to set concrete targets and benchmarks and thus to prioritize areas and sites for engagement and investment in an objective way. They also define the desired changes that an NFP aims to bring about and enable the monitoring activities that define progress towards the achievement of SFM and other intended results.

However, C&I for forest sustainability are not well known outside the forest sector, partly because of limited communication and/or engagement. To strengthen the use of C&I for SFM, it is important to demonstrate their benefits and create incentives for using them. Some actions could include communicating the framework outside the forest sector (e.g. to local governments, schools, community-based organizations, actors along the value chain and other sectors such as energy and health) and using C&I to encourage dialogue and provide evidence on key elements of C&I in professional communications.

Promote leadership and ownership through inclusive participation in NFP and C&I development

To promote leadership and ownership, users need to be involved in the processes of developing NFPs and C&I. This involvement will help promote recognition of the added value of using C&I to enhance RBM in NFPs. If potential users are actively involved, then the NFP, the C&I and the monitoring programmes to track progress become the users' own processes, and their support for the processes then follows. The main groups to involve in adapting and using C&I are those affecting or affected by forests and SFM – mainly forest owners and users at the local level (smallholders, community groups, indigenous nations and groups, informal operators) and those making decisions about land use and land use change, including investors in agriculture, forestry and other land uses. With changing conditions and the emergence of new technologies, such as biomass conversion into liquid transportation fuels, the number and diversity of stakeholders will change and likely grow.

Better ownership is manifested by stronger RBM and integration of SFM elements into multi-year plans of forest and other sustainable development strategies. The process of developing country outlook papers as a platform for reviewing and refining indicators could also stimulate ownership.

Provide adequate funding for implementation and M&E of NFPs

Collecting baseline data and monitoring C&I to measure progress towards SFM both require human, technological and financial resources. However, countries generally put more resources into project implementation or external initiatives than into the development and promotion of C&I for SFM or their monitoring and evaluation.

International cooperation (mainly through FAO) has been investing in national forest monitoring systems – one of the mechanisms for providing information – for more than a decade. However, NFM systems have not really been used to discuss C&I, and they have only been linked to NFPs in discussion of information needs.

Promoting C&I during the early stages of framing the NPF – in other words, early establishment of outcomes and targets for which monitoring will be required – can help in securing budget for M&E, while integrating C&I permanently in the NFP system.

Simplify and harmonize C&I for SFM

As full C&I sets are complex, they are rarely used in their entirety. Different users often need sets with fewer indicators addressing relevant key issues. To promote the use of C&I and make full use of their potential, generic sets of C&I need to be reviewed, simplified and adapted for each user group and specific purpose. There is a strong need to limit the number of indicators selected for use in a particular situation to provide the most efficient screening of resource conditions that are vitally important to stakeholders in the NFP process. This will help maximize benefits from monitoring with cost-efficient investments of people, technology and funding. An excellent approach is to develop simple dashboards of a vital few indicators that are adapted to the users.

At the regional level, some C&I processes have made substantial progress over the past two decades in developing and using a common set of C&I. Collaborative and coordinated efforts should be undertaken to further harmonize forest monitoring and reporting and to link different regional C&I initiatives. A global forest indicator partnership is also an option. Yet even where common sets of C&I are available, individual countries pick and choose the C&I of greatest meaning and value to their individual situations. This enhances the C&I's added value and efficiency.

At the national level, country commitment for harmonization of C&I data sets (inter- and intra-agency coordination) is often needed. Having multiple agencies take inconsistent and redundant measurements of the same or similar ecological conditions is wasteful.

Ensure effective and innovative data management

Computer-based tools should be developed to simplify the task of using C&I for monitoring, analysis and generation of periodic synthesis reports on SFM. This will result in uniformity of data and efficiencies in data collection and supply, with much of the data usable for a range of reporting purposes. The mantra should be, "Collect data once, use it many times".

Moreover, while the capacity of governments to invest in forest monitoring and data collection may have declined, new technology has made data available that were previously too expensive to collect. Continued innovation and meaningful investment in data collection/data archiving with appropriate metadata and in reporting mechanisms will be required to keep the C&I process current and useful into the future.

Facilitate a cross-sectoral, landscape approach

Deforestation has many causes. Especially for this reason, the forest sector cannot be fully separated from other sectors. At the landscape level, policy dialogue, communication, assessments and promotion of more sustainable practices tend to address broader land-use perspectives and competing values and goals. In addition, the emerging framework of SDGs provides a strong opportunity to address crucial cross-sectoral issues affecting the sustainability of forests and the benefits they provide, by making the contributions of forests and their linkages to other land uses more broadly visible.

Furthering synergies with SDGs will require substantial work in developing related forest indicators, particularly on the socio-cultural aspects of SFM, as well as integrated indicators on sustainable agriculture and land use. As social, cultural and governance indicators are currently sparse, efforts should be taken to develop them further or to improve them through linkage with indicators used in other sectors, especially those focused on human development. The interfacing of C&I for SFM with other human development–related indicator sets can help to promote support for the forest sector among local governments and other sectors.

Reinforce capacity-building and feedback

If the purpose of the C&I and the role of each individual in their implementation are not well understood, they are unlikely to be effective. It is necessary to select appropriately prepared individuals for M&E and related positions, and to provide instructions and full training to the personnel involved through structured training courses in the use of C&I for SFM.

Providing feedback to people and to programmes is simple, inexpensive and highly effective. If technicians receive feedback on the information that they are required to submit, they will know if they have done what was expected and if it was considered useful. Without feedback loops, the people involved may start to question whether the data collection and reporting have any value and will eventually become less inclined to put any effort into it. In contrast, when people's work is recognized, and in particular when they can see how their work has actually been used, they come to understand its value and are encouraged to continue and even intensify their efforts (Perrin, 2002). This is also important for people living in and around forest areas, who usually have less contact with the forest service (or any service) and receive less information because they are many, scattered, located in poorly accessible areas and often difficult to reach by modern communication technologies.

Outlook

The global community has accumulated experience in the development and application of C&I for SFM at various levels, and C&I have been recognized as an important means for assessing progress towards SFM. The lessons discussed in this document can be applied in establishing new NFPs following recently adopted policy, in updating existing NFPs following policy reforms, or in strengthening them by applying RBM approaches. Further, enough examples are available (although limited) to suggest that the same C&I approach can be applied to rangelands/grasslands and agricultural lands.

The C&I framework for sustainability in the forest sector has led to a shared understanding in policy development and decision-making of the values underpinning SFM, and to a more comprehensive and balanced portrayal of this range of values in reporting on forests. C&I are an effective tool for enabling fair and objective decisions and have provided a scientifically credible basis for statements on forest management, clarity and transparency, as well as an efficient way to structure data collection for assessing progress towards SFM. They have also enabled countries to communicate more effectively to the public and to the global community on the status of SFM and their progress.

Research has shown that successful application of RBM is largely contingent on how RBM tools (such as log frames and sets of C&I) are used. Results frameworks and C&I sets are not meant to be static documents simply annexed to a programme document and shelved. Rather, they are dynamic tools that should constantly be used to guide programming and that should be updated on a periodic basis to reflect changed realities.

If used correctly during planning and implementation, C&I have potential to promote sustainable practices in the forest sector, including but not limited to forest certification standards. They also provide an essential reference on which performance targets can be set for SFM.

While challenges remain in developing and using C&I for SFM, they do have the potential to provide a practical way to apply RBM to NFPs and thus to bring the forest sector closer to achieving SDG 15 ("Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss") and to enhance its contribution to other relevant SDGs. Experts have expressed the need to strengthen effective monitoring and reporting of forest contributions to SDGs and targets as well as to UNFF and relevant environmental conventions. The forest sector can build on the work on C&I not only for measuring progress towards SFM, but also to demonstrate the contributions of forests to the SDGs. For example, integrating SDG-relevant criteria and indicators into NFPs can facilitate the follow-up of country-level contributions to SDGs.

C&I have undoubtedly helped to develop a common understanding and language for SFM, and thus they offer a potentially helpful means for standardization and for improving monitoring and decision-making. C&I have been widely applied in both developed and developing countries, in both northern and southern hemispheres, and in both wet and dry forests from tropical to boreal zones. They work! They create dividends for people, for governments and for non-governmental organizations. They have been widely applied, particularly for international and national reporting and for forest certification. But they have fallen short of the general ambition to use them as a more operational framework for planning and implementing follow-up actions, as now intended with SDG indicators. The latter are used as a framework for setting operational targets, providing a baseline and means to assess and report on progress towards target attainment. In this way, SDG indicators help shape and focus policies and actions at different levels. They guide management practice and are a key tool for communicating results. Amending and using C&I for SFM in a similar way will help to realize their full potential. This requires renewed effort at all levels.

Outcomes from the application of C&I for SFM – including their use at the landscape level, to track forests' contributions to biodiversity, soil, water, livelihoods and economies – need to be widely disseminated to the public. Further, C&I for SFM provide a pattern that can be adapted to other natural landscapes such as croplands, orchards, grasslands and shrublands. Broader use of C&I for SFM and in other natural landscapes will further strengthen political support for the use of C&I and the integrated thinking, dialogue and consensus building so essential for achieving sustainable development and effective resource conservation. Finally, exploiting synergies in developing and using C&I – collecting data once and using it many times – is expected to make it easier to secure much-needed financial and human resources for monitoring, analysis and reporting.

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Annex 1. Examples of existing regional sets of C&I for SFM

Pan-European Criteria and Indicators for Sustainable Forest Management

C1: Maintenance and Appropriate Enhancement of Forest Resources and their Contribution to Global Carbon Cycles	
Indicator	***Description***
C.1 Policies, institutions and instruments to maintain and appropriately enhance forest resources and their contribution to global carbon cycles	
1.1 Forest area	Area of forest and other wooded land, classified by forest type and by availability for wood supply, and share of forest and other wooded land in total land area.
1.2 Growing Stock	Growing stock on forest and other wooded land, classified by forest type and by availability for wood supply.
1.3 Age structure and/or diameter distribution	Age structure and/or diameter distribution of forest and other wooded land, classified by availability for wood supply.
1.4 1.4 Forest carbon	Carbon stock and carbon stock changes in forest biomass, forest soils and in harvested wood products
C2: Maintenance of Forest Ecosystem Health and Vitality	
Indicator	***Description***
C.2 Policies, institutions and instruments to maintain forest ecosystem health and vitality	
2.1 Deposition and concentration of air pollutants	Deposition and concentration of air pollutants on forest and other wooded land
2.2 Soil condition	Chemical soil properties (pH, CEC [cation exchange capacity], C/N, organic C, base saturation) on forest and other wooded land related to soil acidity and eutrophication, classified by main soil types
2.3 Defoliation	Defoliation of one or more main tree species on forest and other wooded land in each of the defoliation classes
2.4 Forest damage	Forest and other wooded land with damage, classified by primary damaging agent (abiotic, biotic and human induced) and by forest type
2.5 Forest land degradation[4]	Trends in forest land degradation
C3: Maintenance and Encouragement of Productive Functions of Forests (Wood and Non-Wood)	
Indicator	***Description***
C.3 Policies, institutions and instruments to maintain and encourage the productive functions of forests	
3.1 Increment and fellings	Balance between net annual increment and annual fellings of wood on forest available for wood supply
3.2 Roundwood	Quantity and market value of roundwood
3.3 Non-wood goods	Quantity and market value of non-wood goods from forest and other wooded land
3.4 Services	Value of marketed services on forest and other wooded land
C4: Maintenance, Conservation and Appropriate Enhancement of Biological Diversity in Forest Ecosystems	
Indicator	***Description***
C.4 Policies, institutions and instruments to maintain, conserve and appropriately enhance the biological diversity in forest ecosystems	
4.1 Diversity of tree species	Area of forest and other wooded land, classified by number of tree species occurring
4.2 Regeneration	Total forest area by stand origin and area of annual forest regeneration and expansion
4.3 Naturalness	Area of forest and other wooded land by class of naturalness
4.4 Introduced tree species	Area of forest and other wooded land dominated by introduced tree species
4.5 Deadwood	Volume of standing deadwood and of lying deadwood on forest and other wooded land
4.6 Genetic resources	Area managed for conservation and utilisation of forest tree genetic resources (in situ and ex situ genetic conservation) and area managed for seed production
4.7 Forest fragmentation[5]	Area of continuous forest and of patches of forest separated by non-forest lands
4.8 Threatened forest species	Number of threatened forest species, classified according to IUCN Red List categories in relation to total number of forest species

[4] Requires to be further developed and checked under which Criterion (2 or 5) better fits

[5] Requires to be further developed and tested

4.9 Protected forests	Area of forest and other wooded land protected to conserve biodiversity, landscapes and specific natural elements, according to MCPFE categories
4.10 Common forest bird species[6]	Occurrence of common breeding bird species related to forest ecosystems
C5: Maintenance and Appropriate Enhancement of Protective Functions in Forest Management (notably soil and water)	
Indicator	***Description***
C.5 Policies, institutions and instruments to maintain and appropriately enhance of the protective functions in forest management	
5.1 Protective forests – soil, water and other ecosystem functions - infrastructure and managed natural resources	Area of forest and other wooded land designated to prevent soil erosion, preserve water resources, maintain other protective functions, protect infrastructure and managed natural resources against natural hazards
C6: Maintenance of other socio-economic functions and conditions	
Indicator	***Explanation***
C.6 Policies, institutions and instruments to maintain other socio-economic functions and conditions	
6.1 Forest holdings	Number of forest holdings, classified by ownership categories and size classes
6.2 Contribution of forest sector to GDP	Contribution of forestry and manufacturing of wood and paper products to gross domestic product
6.3 Net revenue	Net revenue of forest enterprises
6.4 Investments in forests and forestry	Total public and private investments in forests and forestry
6.5 Forest sector workforce	Number of persons employed and labour input in the forest sector, classified by gender and age group, education and job characteristics
6.6 Occupational safety and health	Frequency of occupational accidents and occupational diseases in forestry
6.7 Wood consumption	Consumption per head of wood and products derived from wood
6.8 Trade in wood	Imports and exports of wood and products derived from wood
6.9 Wood energy	Share of wood energy in total primary energy supply, classified by origin of wood
6.10 Recreation in forests	The use of forests and other wooded land for recreation in terms of right of access, provision of facilities and intensity of use

Source: Forest Europe (2015).

[6] Requires further development and testing for consideration

Lepaterique Process of Central America on C&I for SFM

Description: The region identified fou criteria and 40 indicators at the regional level and 8 criteria and 53 indicators at the national level (initiated in Tegucigalpa, Honduras from 20–24 January 1997). This was the beginning of the Process which was later on complemented by 2 FAO/CCAD supported subregional meetings and 7 national seminars on country-level implementation and on the identification of criteria and indicators at the forest management unit level. Member countries (7): Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama. Partner organizations: CATIE, Finnish-funded regional project PROCAFOR, FAO.

i. Regional criteria and indicators for Central America

Criterion 1: Existence of a legal, political, institutional, technical and socio-economic framework which promotes and guarantees sustainable forest management and conservation of the resources
1.1 Implementation of well-defined regional policies related to the development, conservation, protection and sustainable management of forests.
1.2. Harmonization of legislation at regional level in support of sustainable forest management.
1.3. Operationalization of regional institutional support to sustainable forest management activities in Central America.
1.4. Regional economic integration recognizes the significant contribution which sustainable forest management can make in the socio-economic development of the region.
1.5. Standardized technical guidelines and for sustainable forest management in the region.
1.6. Fulfillment of economic and social functions of forest resources, with due concern to the needs of local communities which depend on the forest.
1.7. Financial mechanisms which promote the sustainable use of forest resources.
1.8. Norms that regulate forest practices in such a way that they will assure implementation of sustainable forest management.
1.9. National plans that support research and training in natural resource management.
1.10. Overall access to, and exchange of technology and information.
1.11. Percentage of population with legal land titles.
Criterion 2: Conservation and maintenance of environmental services provided by forest ecosystems
2.1. Total forest cover of the Region in relation to: - Land surface of Central America - Potential forest area - Area of forest in protected areas - Area of forest outside of protected areas - Change of land use: forest to other land uses (deforestation rate)
2.2. Area forest under management in relation to: - Area of forest in protected areas - Area of forest outside of protected areas.
2.3. Percentage and area of various forest types found in the Protected Area Network of the Region.
2.4. Area and length of the Biological Corridor.
2.5. Environmental impacts of forest management.
2.6. Estimate of carbon stored in the Central American forests.
2.7. Implementation of mechanisms to regulate capture and illegal marketing of species of flora and fauna.
2.8. Area and percentage of forests affected by anthropogenic and natural agents.
2.9. Area and percentage of forested lands managed for recreation and tourism in relation to the total forest area in the Region.
2.10. Number of endemic, threatened and/or endangered species.
2.11. Area and percentage of degraded lands reclaimed through forestry operations.
2.12. Number of forest species conserved ex-situ (e.g. in seed banks).
2.13. Area and percentage of forest managed for the protection of watersheds.
Criterion 3: Maintenance of productive capacities of forest ecosystems
3.1. Forest area classified by management category and type of land tenure.
3.2. Goods and services provided by the forest ecosystems according to management category.
3.3. Structure and species composition of forest ecosystems.
3.4. Productive potential and present status of forest ecosystems.
Criterion 4: Maintenance and enhancement of multiple socio-economic and cultural benefits of forest ecosystems to meet the needs of all levels of society
4.1. Investment in forestry in relation to the GNP.
4.2. Increase in the level and quality of life of local communities involved in forest management activities.
4.3. Balance of commerce in the forestry sector.
4.4. Employment opportunities in forestry (direct and indirect) Direct and indirect forestry related job opportunities in relation to gender.
4.5. Aggregate values of carbon fixation.
4.6. Availability and value of firewood for domestic use.
4.7. Increase in, and benefits from tourism related to forest ecosystems.
4.8. Fulfillment of commitments related to international agreements and conventions on indigenous rights (International

Labor Organization, Convention 169).
4.9. Implementation of measurements that assure equal distribution of from access to and use forest resources with due consideration to gender issues.
4.10. Implementation forest management plans with special reference to socio-economic issues.
4.11. Number and percentage of people employed in the forestry sector.
4.12. Internalization of costs for the benefit of local communities.

ii. National level criteria and indicators for Central America

Criterion 1: Existence of a legal, political, institutional, technical and sosio-economic framework which promotes and guarantees the sustainability of forest management and the conservation of the forest resources
1.1 A dynamic and participative forest policy integrated with other sectors; and implemented in support of sustainable forest management.
1.2. Forest legislation which facilitates the implementation of national forest policies and of established forest management plans.
1.3. Availability of technical and financial resources which permit governmental and non-governmental institutions to implement and supervise adherence to established forest policies.
1.4. Updating of curricula in forestry training institutions.
1.5. Economic policies which promote the sustainable management of forest resources.
1.6. Implementation of a National Forest Research Plan which aims at strengthening the capacity for transfer.
1.7. Norms that regulate forestry practices in such a way that they will assure the implementation of sustainable forest management.
1.8. A legal framework that guarantees respect for cultural values and for the use of forest resources in property of local dwellers with emphasis on indigenous communities.
1.9. Providing means to stakeholders and local governments to strengthen their involvement in, and support to, sustainable forest management.
Criterion 2: Forest cover
2.1. Total forest cover of the Region in relation to: - Land surface of Central America - Potential forest area - Area of forest in protected areas - Area of forest outside of protected areas - Change of land use: forest to other land uses (deforestation rate)
2.2. Area forest under management in relation to: - Area of forest in protected areas - Area of forest outside of protected areas.
Criterion 3: Forest health and vitality
3.1. Regeneration and changes in the composition and structure of forest ecosystems.
3.2. Area and percentage of forest affected by natural agents.
3.3. Area and percentage of forest affected by anthropogenic agents.
Criterion 4: Contribution of forest ecosystems to environmental services
4.1. Number and area of protected areas with established management plans, working plans and/or applied silviculture.
4.2. Area and percentage of forests managed for recreation and tourism in relation to the total national land area.
4.3. Number, area and percentage of watersheds with a management plan.
4.4. Area and percentage of forest managed for soil and water conservation.
4.5. Relation between forest cover by watershed and frequency of flooding.
4.6. Estimates of biomass estimates forest ecosystems as a function of carbon sequestration and carbon sinks.
Criterion 5: Biological diversity in forest ecosystems
5.1. Percentage and area of forest types in the various categories of protected areas.
5.2. Number of endemic, threatened and/or endangered species.
5.3. Estimates on wildlife species dependent on forest habitats.
5.4. Area and length of Biological Corridors per forest ecosystem.
5.5. Area and percentage of primary and secondary forests and of plantations.
5.6. Number of species conserved ex-situ (e.g. in seed banks).
Criterion 6: Productive functions of forest ecosystems
6.1. Forest area under management through the implantation of legally authorized management plans.
6.2. Goods and services provided by forest ecosystems.
6.3. Annual harvest of wood and non-wood forest products in relation to levels of sustainability.
6.4. Production of firewood and charcoal per management category.
6.5. Diversification of products from the forest: wood and non-wood products.
6.6. Production from managed forests in relation to forest production at national level.
6.7. Growth and yield of forest species and stands.
6.8. Silvicultural prescriptions for each type of forest.

Criterion 7: Scientific and technological capacities for the development of the forest resource
7.1. Common terminology in the field of natural resource management.
7.2. Maintenance of information systems on recording on the productive capacities of forest ecosystems.
7.3. Investment in forestry research, training and education and in technology transfer.
7.4. Implementation of a national forest research and training plan in support of natural resource management.
7.5. Mechanisms for horizontal cooperation in forestry.
7.6. Access and exchange to information technology.
Criterion 8: Maintenance and improvement of the multiple socio-economic and cultural benefits of the forest ecosystems required to attend the needs of society in general.
8.1. Investment in forestry in relation to the GNP.
8.2. Contribution of environmental services, and of wood and non-wood forest products to the GNP.
8.3. Employment opportunities in forestry (direct, indirect) for women in local communities.
8.4. Quality of life of local communities involved in sustainable forest management activities.
8.5. Balance of commerce in the forestry sector.
8.6. Aggregate value of carbon fixation.
8.7. Value of firewood for domestic and industrial use.
8.8. Increase in, and benefits from ecotourism.
8.9. Instrumentalization to guarantee the proper application of international agreements and contracts in relation to the recognition of indigenous property rights. (United Nations International Labor Organization, Convention 169).
8.10. Fulfillment of commitments related to international agreements and conventions on indigenous rights (ILO Convention 169).
8.11. Implementation of measures that assure equal distribution of benefits from access to and use of forest resources, with due consideration to gender issues.
8.12. Local community participation in forestry activities and in the distribution of benefits.
8.13. Internalization of costs for the benefit of local communities.

Source: Castañeda, Palmberg-Lerche and Vuorinen (2001).

C&I of the Tarapoto Process for Amazonian forests

Description: The "Tarapoto Proposal of Criteria and Indicators for Sustainability of the Amazon Forest" is sponsored by ACTO. Based on work initiatied in February 1995 in Tarapoto, Peru, the 8 participating countries (Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela) proposed 1 criterion and 7 indicators at the global concern. Furthermore, it identifies 7 criteria and 47 indicators for implementation at the national level. For the forest management unit level, the process recognises 4 criteria and 22 indicators.

iii. National level

Criterion 1: Socio-economic benefits
1.1 Indicators of Income, Production and Consumption • Economic profitability of management and sustainable use of the forests. • Sustainable production, consumption and extraction of forest products. • Values of forest products from sustainable sources and from unsustainable sources as percentages of Gross National Product. • Employment and direct and indirect income from sustainable activities in the forest sector and generation of forest-based employment in relation to total national employment. • Average per capita income in different forest sector activities. • Efficiency and competitiveness of forest product production and processing systems • Impact of the economic use of forests on the availability of forest resources of importance to local populations. • Relationship between direct and indirect uses of the forests.
1.2. Indicators of Investment and Economic Growth in the Forest Sector • Annual investment in plantations, sustainable forest management and conservation in relation to total forest sector investment. • Aggregate value of sustainable forest sector production. • Rate of return on investment of the distinct economic activities in the sustainable forest sector, compared with rates of return in other sectors of the economy, considering all costs and benefits. • Rate of increase of sustainable recreation and tourism activities.
1.3 Indicators of Cultural, Social and Spiritual Needs and Values • Area and percentage of forest lands, in relation to total forest lands area, managed to protect cultural, social and spiritual needs and values. • Area and percentage of forest lands use for purposes of supporting local populations. • Level of participation of local populations in the management and in the benefits generated by forest activities. • Development of productive alternatives to illicit crops and mining.
Criterion 2: Policies and legal-institutional framework for sustainable development of the forests
2.1 Appropriate political and legal framework that stimulates sustainable development as a joint effort between the various levels of government and non-governmental groups.
2.2 Policies and legal framework for environmental planning through ecological-economic zoning.
2.3 Capacity to implement international instruments on which the country is part.
2.4 Harmonization and implementation of existing legislation in the country.
Criterion 3: Sustainable forest production
3.1 Extension and proportion of forest lands and forests dedicated to sustainable production in relation to the total permanent production area.
3.2 Quantity and proportion of sustainable forest production in comparison with the national total forest production.
3.3 Quantity and proportion of units of sustainable production, by area class, in comparison with the national total number of units.
3.4 Area and percentage of forest lands managed for recreation and tourism, in relation to total forest area.
3.5 Level of diversification of sustainable forest production.
Criterion 4: Conservation of forest cover and of biological diversity
4.1 Area, by forest type, in categories of protected areas, in relation to total forest area.
4.2 Measures for «in situ» conservation of species in danger of extinction.
4.3 Measures for the conservation of genetic resources.
4.4 Area and percentage of forest affected by processes or other agents (insect attack, disease, fire, flooding etc.)
4.5 Rate of natural regeneration, species composition and survival.
4.6 Rate of conversion of forest cover to other uses.
4.7 Area and percentage of forest lands with fundamental ecological changes.
4.8 Impact of activities in other sectors on the conservation of forest ecosystems (mining, ranching, energy, infrastructure, etc.).
Criterion 5: Conservation and integrated management of water and soil resources
5.1 Measures for soil conservation.
5.2 Area and percentage of forest lands managed for environmental protection.

5.3 Percentage of forest flooded in relation to the historic range of variation, and maintenance of the relationship between the forest and hydrobiological resources.
5.4 Effects of forest conservation on the integrated management of water resources.
Criterion 6: Science and technology for the sustainable development of the forests
6.1 Quantity and quality of adequate technology for forest management and sustainable production.
6.2 Level of recuperation and degree of use of autochthonous technologies.
6.3 Investment in research, education and technology transfer.
6.4 Quantity and quality of research and sustainable development in execution.
6.5 Mechanisms for remuneration for traditional knowledge.
6.6 Degree of access to technology and information by different social groups.
Criterion 7: Institutional capacity to promote sustainable development in Amazonia
7.1 Quantity and quality of institutions and of their intersectoral and inter-institutional coordination.
7.2 Existence of plans and their degree of execution.
7.3 Quantity and quality of education and research programs.
7.4 Degree of effective participation by civil society (academic institutions, grassroots groups, NGOs, trades unions and the private sector).

iv. Management unit level

Criterion 8: Legal and institutional framework
8.1 Forest management plan approved by the competent authorities.
8.2 Periodicity of evaluation of management plan implementation and average percent; age of implementation.
8.3 Legal framework that guarantees the stability of long-term investments in the forest sector.
Criterion 9: Sustainable forest production
9.1 Annual extraction of timber and non-timber forest products compatible with the sustainability capacity of the resource base.
9.2 Area and percentage of forest soils affected by significant alterations in physical-chemical properties and erosion.
9.3 Effectiveness of systems of administration and control.
9.4 Degree of diversification of production.
9.5 Degree of utilization of environmentally friendly technologies.
Criterion 10: Conservation of forest ecosystems
10.1 Proportion of area of permanent production in areas of environmental protection.
10.2 Measures to protect, recuperate and sustainable use wild populations of species in danger of extinction.
10.3 Area and percentage of forest affected by processes or other natural agents (insect attack, disease, fire, etc.) and by human actions.
10.4 Rates of regeneration and forest ecosystem structure.
10.5 Soil conservation measures.
10.6 Measures for protection of water courses from forest activities.
Criterion 11: Local socio-economic benefits
11.1 Quality 'of life of local populations.
11.2 Profitability and rate of return of forest management.
11.3 Efficiency of systems of production and transformation of forest products.
11.4 Impact of the economic use of the forest on the availability of forest resources of importance to local populations. Amount of direct and indirect employment, and income level.
11.5 Nature and quantity of benefits deriving from forest management.
11.6 Annual quantity of products extracted per hectare.
11.7 Aggregate value of production.
11.8 Mechanisms for consultation and the effective participation of local communities in the management of forest resources, depending upon the scale of management.

v. Services at the global level

Criterion 12: Economic, social and environmental services performed by Amazonian forests
12.1 Contribution to satisfying the global demand for sustainable produced timber and non-timber forest products.
12.2 Contribution to the global carbon balance.
12.3 Contribution to the global water cycle.
12.4 Contribution to the conservation of biological diversity.
12.5 Contribution to radiation balance and regulation.
12.6 Contribution to the maintenance of cultural values and diversity, and of indigenous and local populations' knowledge.
12.7 Contribution to the economy, health, culture, science and recreation.

Source: ACT (1995).

Revised International Tropical Timber Organization (ITTO) C&I for the sustainable management of tropical forests

Description: ITTO's C&I for the sustainable management of natural tropical forest are tools for monitoring, assessment and reporting on forest management in tropical member countries. This 2016 document includes a simplified set of indicators and a shortened format for reporting. It represents an updated version of the original ITTO C&I, which were published in 1992 as *Criteria for the measurement of sustainable tropical forest management*, and were subsequently revised in 1998 and 2005 to take into account the numerous developments in ITTO and internationally that followed the United Nations Conference on Environment and Development in 1992. Many countries are currently reporting on this set of C&I.

Criterion 1: Enabling conditions for sustainable forest management
Policy, legal and governance framework
1.1 Policies, laws and regulations for governing forests
1.2 Forest tenure and ownership
1.3 Forest governance
Institutional framework
1.4 Institutions responsible for, and supportive of, forest management
1.5 Availability of professional and technical personnel to perform and support forest management
Planning and monitoring framework
1.6 Integration of forests in national and subnational land-use planning
1.7 Capacity and mechanisms for management planning and the periodic monitoring of implementation
1.8 Long-term projections, strategies and plans for production PFE and protection PFE
1.9 Stakeholder participation in land-use and forest management planning, monitoring and assessment
Economic framework
1.10 National, subnational and international public and private funding committed to SFM
1.11 Incentives to encourage SFM
Criterion 2: Extent and condition of forests
2.1 Extent and percentage of total land area under comprehensive land-use plans
2.2 Extent of forests committed to production and protection
2.3 Extent and percentage of total land area under each forest type
2.4 Multi-year forest management plans in FMUs
2.5 Forest area in compliance schemes
2.6 Change in forested area
2.7 Forest condition
2.8 Forest carbon stock
Criterion 3: Forest ecosystem health and resilience
Addressing threats to, and vulnerabilities of, forests
3.1 Threats to forests caused directly by human activities
3.2 Vulnerability of forests to natural disturbances
3.3 Forest resilience and climate-change adaptation
Restoration of degraded forests and lands
3.4 Degraded forests and landscapes restored
3.5 Area of formerly degraded forest or forest land restored
Criterion 4: Forest production
Resource assessment
4.1 Natural production forest inventories, by product
4.2 Actual and allowable harvest of wood and non-wood products in natural forests
4.3 Actual harvest of wood and non-wood products in planted forests
4.4 Forest carbon stock
Harvesting planning and control procedures
4.5 Timber harvesting arrangements in natural production forests
4.6 Forest product tracking systems or similar control mechanisms
4.7 Historical records on the extent, nature and management of forests
Silviculture in natural and planted forests
4.8 Reduced impact harvesting and silvicultural operations
4.9 Silvicultural management in planted forests
4.10 Strategic monitoring of silvicultural systems in natural and planted forests
Criterion 5: Forest biological diversity
Ecosystem diversity
5.1 Forest extent in protected areas
5.2 Buffer zone management and connectivity of protected forest areas
Species diversity

5.3 Threatened forest-dependent species
5.4 Procedures for conserving tree species diversity in natural tropical forests
Genetic diversity
5.5 In situ conservation of genetic variation within specified forest tree species
Biodiversity conservation in production forests
5.6 Biodiversity conservation measures in natural production forests
5.7 Biodiversity conservation in planted forests
Criterion 6: Soil and water protection
Extent of protection
6.1 Forest area managed primarily for the protection of soil and water
6.2 Protection of downstream catchment values at the landscape level
Protective functions in production forests
6.3 Soil productivity and water retention capacity in production forests
6.4 Area of production PFE considered environmentally sensitive and protected
6.5 Forest engineering for soil and water protection
Criterion 7: Economic, social and cultural aspects
Economic aspects
7.1 Contribution of the forest sector to gross domestic product
7.2 Value of domestically produced forest products and environmental services
7.3 Wood and non-wood forest product processing capacities and efficiency
Social and cultural aspects
7.4 Capacity-building of the workforce in forest management and forest industry
7.5 Procedures to ensure the health and safety of forest workers
7.6 Mechanisms for the equitable sharing of the costs and benefits of forest management
7.7 Mechanisms for resolving disputes between forest stakeholders
7.8 Local livelihoods and forest management
7.9 Forests reserved for specific cultural, research or educational purposes
Community and indigenous peoples' rights and participation in forest management
7.10 Tenure and user rights of indigenous peoples and local communities over publicly owned forests
7.11 Involvement of indigenous peoples and local communities in forest management
7.12 Recognition and value of forest-management knowledge and skills of local people

Source: ITTO (2016).

Montréal Process Working Group's Criteria and Indicators for sustainable management of temperate and boreal forests (2015 version)

Description: The Montréal Process Working Group was formed in 1994 as a bold, intergovernmental response to the pressing need for SFM. One of its first tasks was to develop and implement internationally agreed-upon C&I for conservation and sustainable management of temperate and boreal forests. The Montréal Process countries are Argentina, Australia, Canada, Chile, China, Japan, Korea, Mexico, New Zealand, Russian Federation, United States of America, and Uruguay. The Montréal Process member countries account for 90% of the world's temperate and boreal forests, 58% of the world's planted forests, 49% of the world's forests, 49% of the world's roundwood production, and 31% of the world's population. Through the Montréal Process, member countries continue to make a voluntary commitment to work alongside each other to further the sustainable management of their forests and to create a pathway for collaboration and capacity-building.

Criterion 1: Conservation of biological diversity
Ecosystem Diversity
1.1.a Area and percent of forest by forest ecosystem type, successional stage, age class, and forest ownership or tenure
1.1.b Area and percent of forest in protected areas by forest ecosystem type, and by age class or successional stage
1.1.c Fragmentation of forests
Species diversity
1.2.a Number of native forest associated species
1.2.b Number and status of native forest associated species at risk, as determined by legislation or scientific assessment
1.2.c Status of on-site and off-site efforts focused on conservation of species diversity
Genetic diversity
1.3.a Number and geographic distribution of forest associated species at risk of losing genetic variation and locally adapted genotypes
1.3.b Population levels of selected representative forest associated species to describe genetic diversity
1.3.c Status of on-site and off-site efforts focused on conservation of genetic diversity
Criterion 2: Maintenance of productive capacity of forest ecosystems
2.a Area and percent of forest land and net area of forest land available for wood production

2.b Total growing stock and annual increment of both merchantable and non-merchantable tree species in forests available for wood production
2.c Area, percent, and growing stock of plantations of native and exotic species
2.d Annual harvest of wood products by volume and as a percentage of net growth or sustained yield
2.e Annual harvest of non-wood forest products
Criterion 3: Maintenance of forest ecosystem health and vitality
3.a Area and percent of forest affected by biotic processes and agents (e.g. disease, insects, invasive species) beyond reference conditions
3.b Area and percent of forest affected by abiotic agents (e.g. fire, storm, land clearance) beyond reference conditions
Criterion 4: Conservation and maintenance of soil and water resources
Protective function
4.1.a Area and percent of forest whose designation or land management focus is the protection of soil or water resources
Soil
4.2.a Proportion of forest management activities that meet best management practices or other relevant legislation to protect soil resources
4.2.b Area and percent of forest land with significant soil degradation
Water
4.3.a Proportion of forest management activities that meet best management practices, or other relevant legislation, to protect water related resources
4.3.b Area and percent of water bodies, or stream length, in forest areas with significant change in physical, chemical or biological properties from reference conditions
Criterion 5: Maintenance of forest contribution to global carbon cycles
5.a Total forest ecosystem carbon pools and fluxes
5.b Total forest product carbon pools and fluxes
5.c Avoided fossil fuel carbon emissions by using forest biomass for energy
Criterion 6: Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of societies
Production and consumption
6.1.a Value and volume of wood and wood products production, including primary and secondary processing
6.1.b Value of non-wood forest products produced or collected
6.1.c Revenue from forest based ecosystem services
6.1.d Total and per capita consumption of wood and wood products in round wood equivalents
6.1.e Total and per capita consumption of non-wood forest products
6.1.f Value and volume in round wood equivalents of exports and imports of wood products
6.1.g Value of exports and imports of non-wood forest products
6.1.h Exports as a share of wood and wood products production and imports as a share of wood and wood products consumption
6.1.i Recovery or recycling of forest products as a percent of total forest products consumption
Investment in the forest sector
6.2.a Value of capital investment and annual expenditure in forest management, wood and non-wood forest product industries, forest-based ecosystem services, recreation and tourism
6.2.b Annual investment and expenditure in forest-related research, extension and development, and education
Employment and community needs
6.3.a Employment in the forest sector
6.3.b Average wage rates, annual average income and annual injury rates in major forest employment categories
6.3.c Resilience of forest-dependent communities
6.3.d Area and percent of forests used for subsistence purposes
6.3.e Distribution of revenues derived from forest management
Recreation and tourism
6.4.a Area and percent of forests available and/or managed for public recreation and tourism
6.4.b Number, type, and geographic distribution of visits attributed to recreation and tourism and related to facilities available
Cultural, social and spiritual needs and values
6.5.a Area and percent of forests managed primarily to protect the range of cultural, social and spiritual needs and values
6.5.b The importance of forests to people
Criterion 7: Legal, institutional and economic framework for forest conservation and sustainable management
7.1.a Legislation and polices supporting the sustainable management of forests
7.1.b Cross-sectoral policy and programme coordination
7.2.a Taxation and other economic strategies that affect the sustainable management of forests
7.3.a Clarity and security of land and resource tenure and property rights
7.3.b Enforcement of laws related to forests

7.4.a Programmes, services and other resources supporting the sustainable management of forests
7.4.b Development and application of research and technologies for the sustainable management of forests
7.5.a Partnerships to support the sustainable management of forests
7.5.b Public participation and conflict resolution in forest-related decision making
7.5.c Monitoring, assessment and reporting on progress towards sustainable management of forests

Source: MPWG (2015).

Annex 2. Global forest indicators in the context of the SDGs

C&I at global levels are the variables used by FAO for the FRA. As global contexts changes, global indicators might differ in FRA from different years.

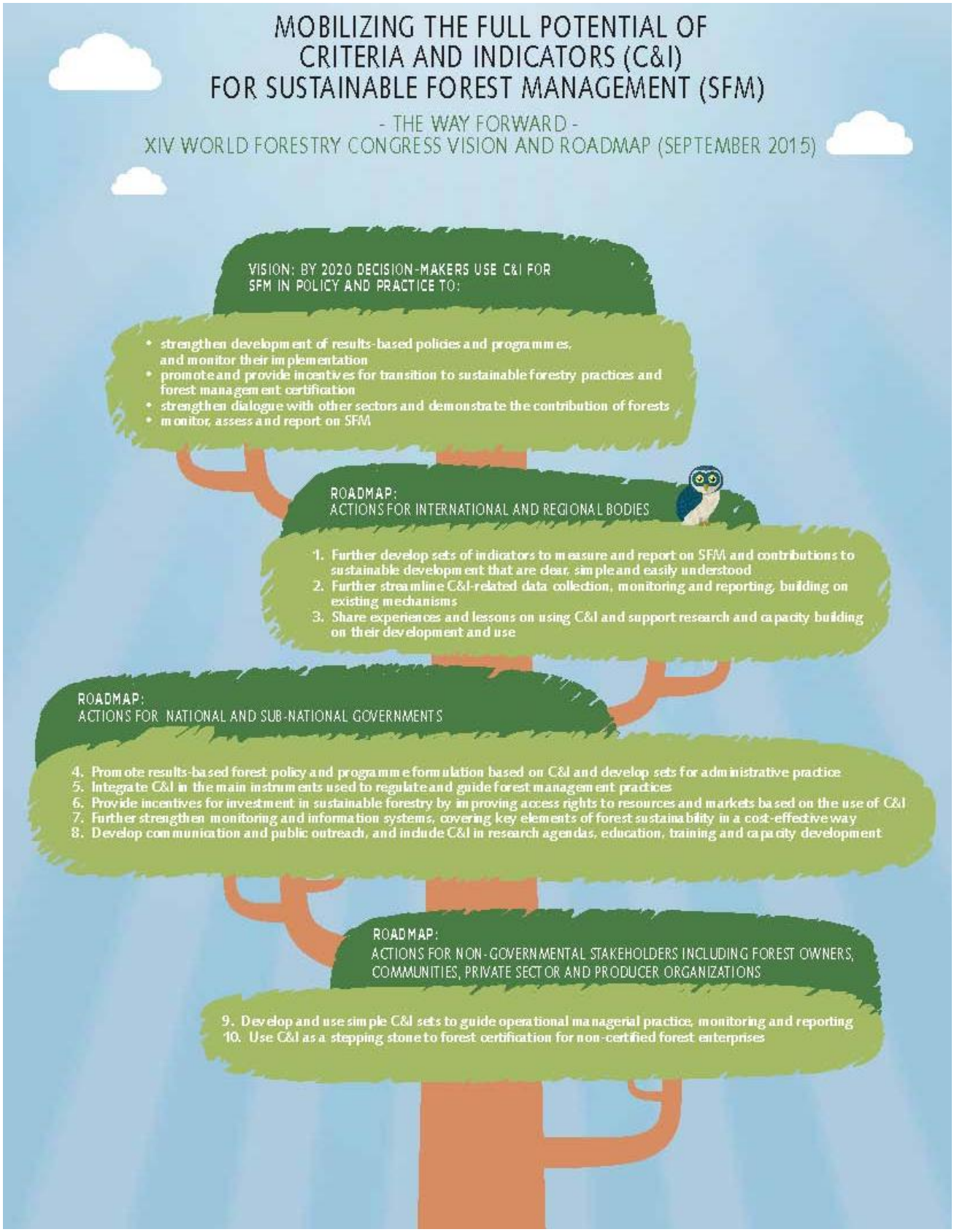
Forests and sustainable management of forest are core aspects of SDG 15, "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss, and its targets". Forests are also explicitly addressed in the SDG6 target 6.6 on water and are crucial to achieving many of the other SDGs and associated targets. Forests are linked to poverty eradication (SDG1), food security and nutrition (SDG2), health (SDG3), gender equality (SDG5), sustainable energy (SDG7), sustainable economic growth (SDG8), infrastructure and innovation (SDG9), sustainable consumption and production (SDG12), climate change (SDG13), peaceful and inclusive societies, justice, and accountable institutions (SDG16), and means of implementation (SDG17). Over the past 25 years, the countries' capacity to monitor forest-related aspects has improved significantly. According to FRA 2015, 81 countries representing 77 percent of the global forest area reported that they have either finalized or initiated their national assessment of forest conditions after 2010. However, reporting progress towards SDGs poses new challenges to the inventories as it will require continuous and consistent monitoring over time.

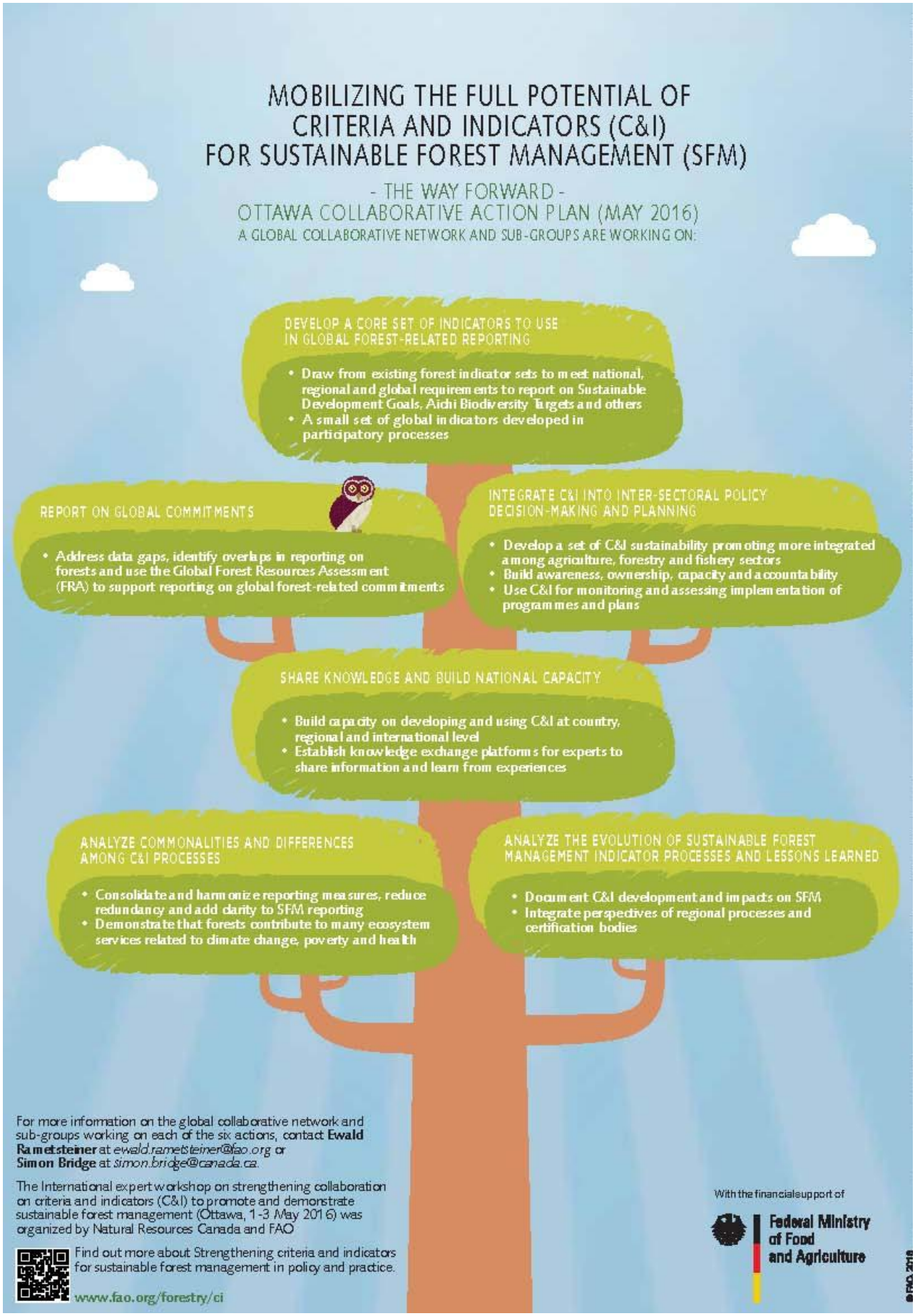
At present, the following table represents the formulation under consideration for SDG 15.

SDG15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	
Target 15.1 By 2020, ensure the conservation, restoration, and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains, and drylands, in line with obligations under international agreements	Indicator 15.1.1 Forest area as a proportion of total land area
Target 15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests, and substantially increase afforestation and reforestation globally.	Indicator 15.2.1 Progress towards sustainable forest management
Target 15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world.	Indicator 15.3.1 Proportion of land that is degraded over total land area
Target 15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development.	Indicator 15.4.1 Coverage of protected areas of important sites for mountain diversity Indicator 15.4.2 Mountain Green Cover Index

For more information, see UN (2016b) and FAO (2015b).

Annex 3. Strengthening forest sustainability indicators – the way forward: WFC roadmap and Ottawa Collaborative Action Plan




MOBILIZING THE FULL POTENTIAL OF CRITERIA AND INDICATORS (C&I) FOR SUSTAINABLE FOREST MANAGEMENT (SFM)
- THE WAY FORWARD -
OTTAWA COLLABORATIVE ACTION PLAN (MAY 2016)
A GLOBAL COLLABORATIVE NETWORK AND SUB-GROUPS ARE WORKING ON:
DEVELOP A CORE SET OF INDICATORS TO USE IN GLOBAL FOREST-RELATED REPORTING
• Draw from existing forest indicator sets to meet national, regional and global requirements to report on Sustainable Development Goals, Aichi Biodiversity Targets and others
• A small set of global indicators developed in participatory processes
REPORT ON GLOBAL COMMITMENTS
• Address data gaps, identify overlaps in reporting on forests and use the Global Forest Resources Assessment (FRA) to support reporting on global forest-related commitments
INTEGRATE C&I INTO INTER-SECTORAL POLICY DECISION-MAKING AND PLANNING
• Develop a set of C&I sustainability promoting more integrated among agriculture, forestry and fishery sectors
• Build awareness, ownership, capacity and accountability
• Use C&I for monitoring and assessing implementation of programmes and plans
SHARE KNOWLEDGE AND BUILD NATIONAL CAPACITY
• Build capacity on developing and using C&I at country, regional and international level
• Establish knowledge exchange platforms for experts to share information and learn from experiences
ANALYZE COMMONALITIES AND DIFFERENCES AMONG C&I PROCESSES
• Consolidate and harmonize reporting measures, reduce redundancy and add clarity to SFM reporting
• Demonstrate that forests contribute to many ecosystem services related to climate change, poverty and health
ANALYZE THE EVOLUTION OF SUSTAINABLE FOREST MANAGEMENT INDICATOR PROCESSES AND LESSONS LEARNED
• Document C&I development and impacts on SFM
• Integrate perspectives of regional processes and certification bodies
For more information on the global collaborative network and sub-groups working on each of the six actions, contact Ewald Rametsteiner at ewald.rametsteiner@fao.org or Simon Bridge at simon.bridge@canada.ca.
The International expert workshop on strengthening collaboration on criteria and indicators (C&I) to promote and demonstrate sustainable forest management (Ottawa, 1-3 May 2016) was organized by Natural Resources Canada and FAO
Find out more about Strengthening criteria and indicators for sustainable forest management in policy and practice.
www.fao.org/forestry/ci
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Annex 4. Glossary of Terms

Activity

Actions taken or work performed through which inputs, such as funds, people, equipment, technical assistance and other types of resources, are mobilized to produce specific outputs.

Baseline

Information gathered at the beginning of a project or programme against which variations that occur in the project or programme are measured.

Benchmark

Reference point or standard, including norms, against which progress or achievements can be assessed. A benchmark refers to the performance that has been achieved in the recent past by other comparable organizations, or what can be reasonably expected to have been achieved in similar circumstances.

Goal

A specific end result desired or expected to occur as a consequence, at least in part, of an intervention or activity. It is the higher order objective that will assure national capacity-building to which a development intervention is intended to contribute.

Impact

Impact implies changes in people's lives. This might include changes in knowledge, skill, behavior, health or living conditions for children, adults, families or communities. Such changes are positive or negative long-term effects on identifiable population groups produced by a development intervention, directly or indirectly, intended or unintended. These effects can be economic, socio-cultural, institutional, environmental, technological or of other types. Positive impacts should have some relationship to the Millennium Development Goals (MDGs), internationally-agreed development goals, national development goals (as well as human rights as enshrined in constitutions), and national commitments to international conventions and treaties.

Inputs

The financial, human, material, technological and information resources used for development interventions.

Mutual Accountability

According to the United Nations Development Action Framework (UNDAF) – a programme document between a government and the United Nations Country Team (UNCT) that describes the collective actions and strategies of the United Nations to the achievement of national development – mutual accountability is interpreted to mean the respective accountability of parties working together toward shared outcomes and it refers to the responsibilities and expected targets of national governments, donors, and other development partners alike.

Outcome

Outcomes represent changes in the institutional and behavioral capacities for development conditions that occur between the completion of outputs and the achievement of goals. Outcomes usually have direct effects on core values of communities of people – whether they live together at a location (communities of place) or whether they have deep feelings about particular forest attributes (communities of interest).

Outputs

Outputs are changes in skills or abilities and capacities of individuals or institutions, or the availability of new products and services that result from the completion of activities within a development

intervention *within the control of the organization*. They are achieved with the resources provided and within the time period specified.

Performance

The degree to which a development intervention or a development partner operates according to specific criteria/standard/guidelines or achieves results in accordance with stated plans.

Performance indicator

A performance indicator is a unit of measurement that specifies what is to be measured along a scale or dimension but does not indicate the direction or change. Performance indicators are a qualitative or quantitative means of measuring an output or outcome, with the intention of gauging the performance of a programme or investment.

Performance monitoring

A continuous process of collecting and analysing data for performance indicators, to compare how well a development intervention, partnership or policy reform is being implemented against expected results (achievement of outputs and progress toward outcomes).

Results

Results are changes in a state or condition that derive from a cause-and-effect relationship. There are three types of such changes - outputs, outcomes and impact - that can be set in motion by a development intervention. The changes can be intended or unintended, positive and/ or negative.

Results based management

Results-based management is a management strategy by which all actors, contributing directly or indirectly to achieving a set of results, ensure that their processes, products and services contribute to the desired results (outputs, outcomes and higher level goals or impact) and use information and evidence on actual results to inform decision making on the design, resourcing and delivery of programmes and activities as well as for accountability and reporting.

Results chain

The causal sequence for a development intervention that stipulates the necessary sequence to achieve desired results – beginning with inputs, moving through activities and outputs, and culminating in individual outcomes and those that influence outcomes for the community, goal/impacts and feedback. It is based on a theory of change, including underlying assumptions.

Results framework or matrix

A results framework or matrix explains how results are to be achieved, including causal relationships and underlying assumptions and risks. The results framework reflects strategic level thinking across an entire organization, a country programme, a programme component within a country programme, or a project.

Target

Specifies a particular value that an indicator should reach by a specific date in the future. For example, "total literacy rate to reach 85 percent among groups X and Y by the year 2010".

Source: UNDG (2011).

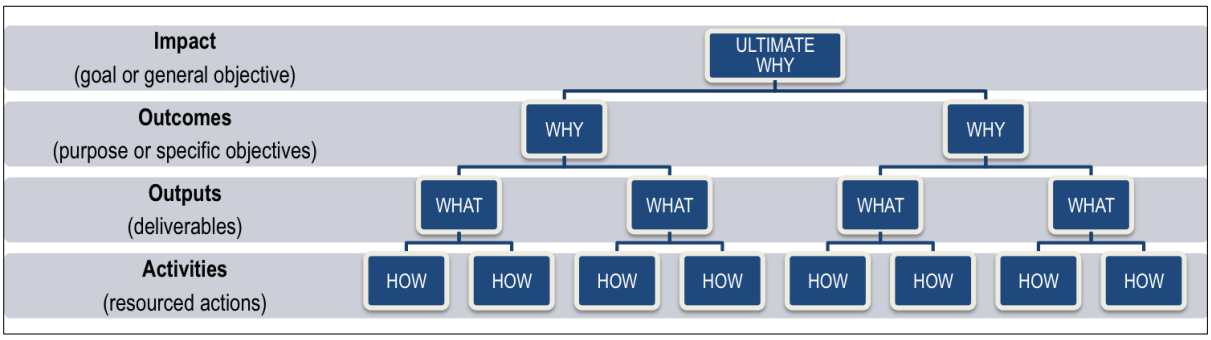
Annex 5. Additional information on RBM

Further explanation of RBM terminology and concepts

While the exact terminology used by different institutions may differ, it is generally agreed that "results" are the *output, outcome(s) and impact* that are set in motion by a development intervention (see Figure A1).

- The **impact** – often called the General Objective or Goal – refers to the desired longer-term, high-**Impact** – often called the General Objective or Goal – refers to the desired longer-term, high-level changes (usually at environmental or societal level) to which the programme or project aims to contribute; it represents the ultimate reason WHY the intervention was designed.
- The **Outcome** – often called the Specific Objective or Purpose – is the medium-term effect (typically on systems or behaviors of the beneficiaries) brought about by delivering a set of outputs; it describes the main reason WHY the intervention is being implemented.
- **Outputs –** sometimes called a Deliverable or Expected Result – can be considered the immediate result or end product resulting from a set of activities; it refers to WHAT a programme or project aims to deliver.

Figure A1. Types of Results [7]



According the OECD, results are *"changes in a state or condition which derive from a cause-and-effect relationship."* As shown in Figure A2 below, these causal relationships are usually shown in the form of a results chain, whereby results are the higher level changes that derive from implementing interventions. There should be a strong credible linkage between each subsequent level of the results chain – from the resourced activities all the way up to impact (or the overall goal) (Flint, 2003). In other words, conducting all of the planned activities should enable the programme to deliver the intended outputs (i.e. programme deliverables); the combination of the various outputs should be *necessary* and *sufficient* to attain the expected outcome (i.e. programme purpose/objectives); and attaining the outcome should enable the programme to contribute to the desired impact (i.e. programme goal).

In addition to the above-described notion of causality, another concept that is central to this basic "Theory of Change" – which underlies every results-oriented programme or project – is that of

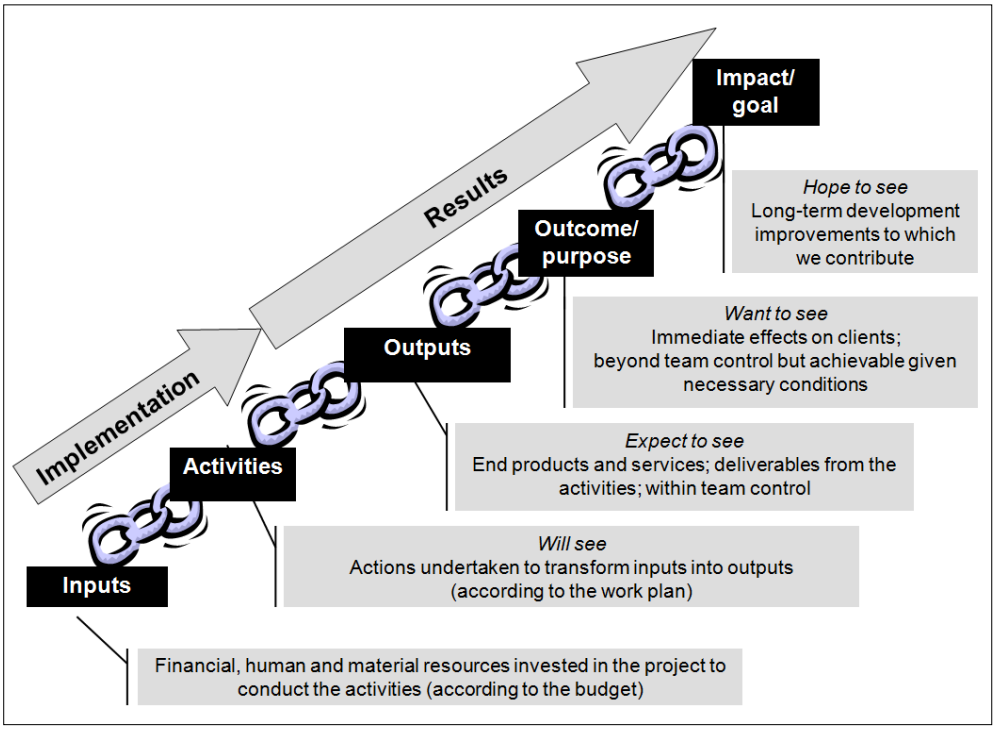
[7] Adapted from UNDP (2009).

attribution (CIDT, 2016). The higher in the results chain (see Figure A2), the less control the programme or project has and the less attribution it can claim for the achievements. This means that:

- A programme or project team is fully accountable for implementing the ***planned activities***.
- The ***expected outputs*** are the direct deliverables resulting from execution of activities, yet their delivery depends upon certain conditions holding true;
- Attaining the ***intended outcomes*** is even more dependent upon external factors and, therefore, requires partnerships and the delivery of a combination of various outputs; and

It is generally recognized that a programme or project can only contribute to the ***desired impact***, because it is a common goal that multiple programmes and project work towards.

Figure A2. Concepts of causality and attribution in the results chain



Source: CIDT (2016), adapted from UNDP (2009).

Principles of RBM

The guiding principles of RBM are described below (based on UNDP, 2009).

vi. National/Local Ownership

Ownership – both in terms of its depth and its breadth – is fundamental in formulating and implementing programmes and projects to achieve development results.[8]

[8] As stated in UN (2008b), "each country must take primary responsibility for its own development and (...) the role of national policies and development strategies cannot be overemphasized in the achievement of sustainable development".

- *Depth of ownership:* Objectives are much more likely to be attained if results frameworks and other RBM tools are actively used to guide ongoing management actions, rather than being developed simply to meet a requirement. While tools and systems are essential for RBM, it is just as important that people understand and appreciate RBM and that they adopt a results-oriented mentality and approach to their work.
- *Breadth of ownership:* A key aim of RBM is to ensure that national ownership goes beyond a few select persons to include as many diverse stakeholders as possible. For this reason, M&E activities, their findings, and any related recommendations should be fully owned by all of those responsible for the results and those who can make use of them.

vii. Inclusiveness and Engagement of Stakeholders

Active stakeholder engagement is critical for effectively designing results-oriented programmes/policies, effectively implementing them, and linking the lessons learned to future programmes and policy improvements. Therefore, throughout all stages of policy-making and programming, it is vital to promote buy-in and commitment as well as motivate action among all relevant stakeholders, i.e. government institutions at national, subnational and local levels, international development partners, civil society organizations and the beneficiary communities themselves.

What is a stakeholder?

An individual or group that *has an interest in* or *is affected by* (whether negatively or positively) a given policy, programme or intervention. This includes the organizations directly involved in implementation and the beneficiary populations, as well as those indirectly concerned by it.

When it comes to stakeholder engagement and inclusiveness, it is important to involve both a *diversity* of stakeholders and an *adequate number* of stakeholders. In addition, *participatory approaches* to design, implementation and management, and MEL are recommended.

viii. Accountability and a Focus on Results

Accountability goes hand-in-hand with results, because it is what ensures that assigned entities deliver the activities and outputs (i.e. results) they have committed to. This principle is based on the approach encouraged by international agreements such as the Paris Declaration and the Accra Agenda for Action, which urge planners to think in terms of how they should work together to support various in-country stakeholders to achieve national priorities and common goals.

In terms of accountability, governments are the primary owner and executing agents of NFPs and are accountable to their people, through their parliaments, for delivering on national development objectives (sometimes referred to as national goals, priorities or outcomes). Recognizing that national outcomes require the collective efforts of multiple stakeholders, the concept of *mutual accountability* has become a well-established criterion for development and aid effectiveness. In this regard, partnerships, joint programmes, collaborative M&E, and other consultative efforts are critical for achieving higher level results.

Nevertheless, accountability is not fungible and must ultimately be attached to a specific actor. As such, many stakeholders, together, contribute to impacts and outcomes; yet each one should be accountable for delivering on its specific *outputs* and on conducting *assigned activities*.

Overview of the Logical Framework Approach (LFA)

The logical framework, or LogFrame, is a commonly used and powerful tool for RBM. Many development agencies, including national governments, multilateral and bilateral partners, and non-government organizations, use LogFrames to summarize the intended results In fact, it is a mandatory component of programmes/projects within many agencies.

The Logical Framework Approach (LFA) is an iterative process of results-oriented analysis, design and management. It involves:

1. Defining the desired results and their causal relationships (which are specified in the first column of the LogFrame matrix);
2. Formulating the indicators that can be used to assess the extent to which those results have been achieved over the course of a programme/project (which are listed in the second column of the LogFrame, alongside the results to which each corresponds);
3. Identifying the sources of data that serves as means of verifying each indicator (which are listed in the third column of the LogFrame, alongside the indicators to which each Means of Verification [MoV] corresponds); and
4. the underlying assumptions about the causal relationships within the results chain and the external factors that may influence success and failure, based on a risk analysis (which belong in the fourth column of the LogFrame, at the level of each result).

The logical framework can help to organize the thinking around a project, programme or policy and can guide the development of mechanisms for minimizing risks and monitoring, reviewing and evaluating progress. Completed logical frameworks form the basis of a project plan and are used as a reference tool for planning, implementation and reporting.

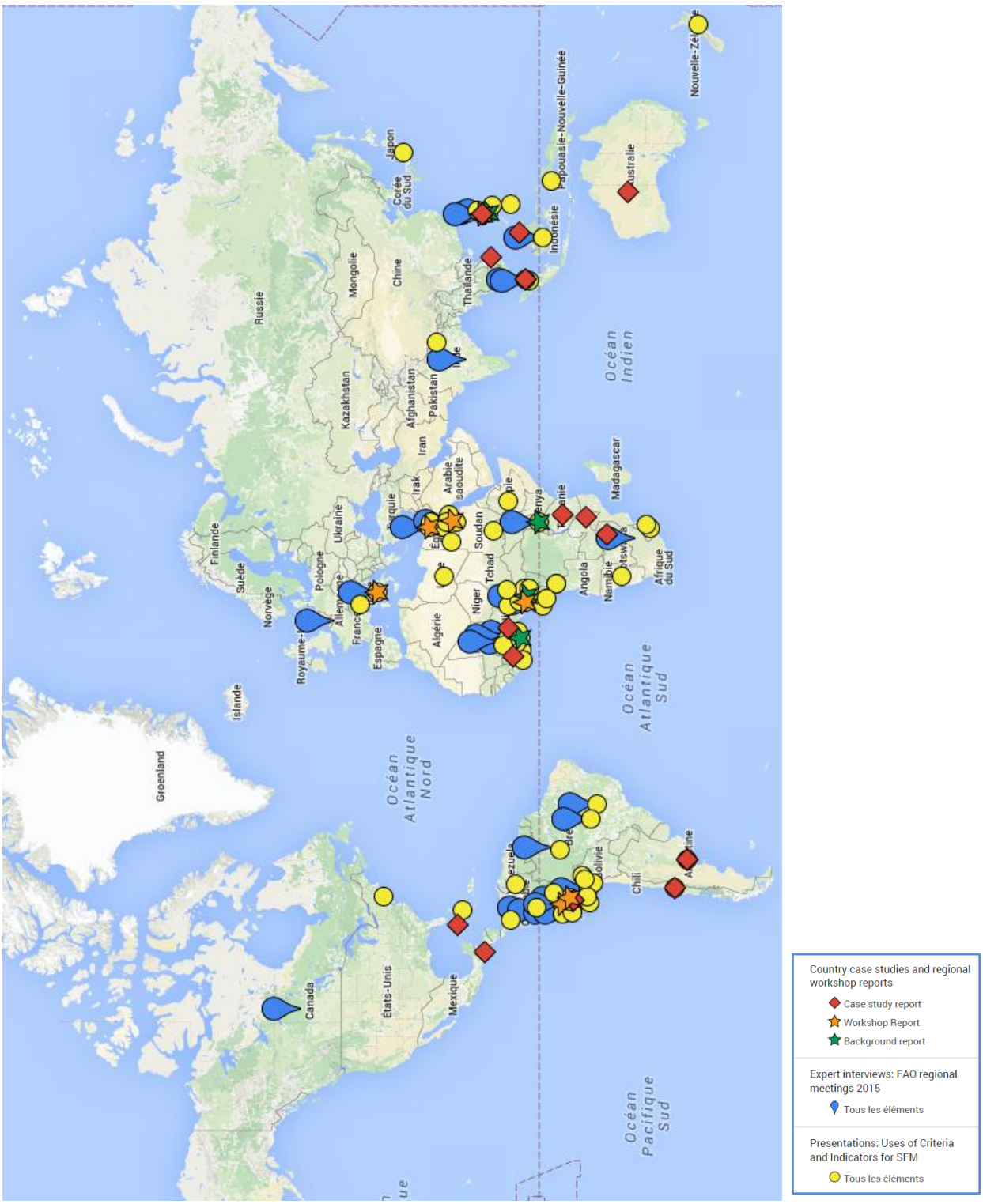
Distinction needs to be made between that process and the documented product of that process, the logical framework matrix. A quality, participatory *process* is vital if a useful and effective product is to be generated. The approach is essentially a way of thinking, or an organizational culture of results.

The logical framework

Results Statements (results chain based on Theory of Change)	Indicators	Means of Verification (MoV)	Assumptions
Impact (Ultimate benefits for target population)	Measures of progress against impact	Data sources to enable measurement of the indicator(s) to the left)	Assumptions made from outcome to impact, based on risks that the impact will not be successfully contributed to.
Outcome (Short to medium term change in development situation)	Measures of progress against outcome	Data sources to enable measurement of the indicator(s) to the left)	Assumptions made from outputs to outcome, based on risks that the outcome will not be achieved.
Outputs (Products and services- tangible/intangible- delivered or provided)	Measures of progress against output	Data sources to enable measurement of the indicator(s) to the left)	Assumptions made from activities to outputs, based on risks that the outputs will not be delivered.
Activities (Tasks undertaken in order to produce research outputs)	Milestones for production of outputs	Data sources to enable measurement of the indicator(s) to the left)	Pre-conditions for the successful implementation of activities.

Source: Adapted from UNDP (2009).

Annex 6. Map of resources contributing to this publication



For more information see FAO (2016c).