POLICY DEVELOPMENT

21

CRITERIA AND INDICATORS FOR THE SUSTAINABLE MANAGEMENT OF TROPICAL FORESTS

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International Tropical Timber Organization

Criteria and indicators for the sustainable management of tropical forests

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Criteria and indicators for sustainable forest management

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The International Tropical Timber Organization (ITTO) is an intergovernmental organization promoting the conservation and sustainable management, use and trade of tropical forest resources. Its members represent the bulk of the world's tropical forests and of the global tropical timber trade. ITTO develops internationally agreed policy documents to promote sustainable forest management and forest conservation and assists tropical member countries to adapt such policies to local circumstances and to implement them in the field through projects. In addition, ITTO collects, analyzes and disseminates data on the production and trade of tropical timber and funds projects and other actions aimed at developing sustainable forest industries at both the community and industrial scales. Since it became operational in 1987, ITTO has funded more than 1000 projects, pre-projects and activities valued at more than US$400 million. All projects are funded by voluntary contributions, the major donors being the governments of Japan, Switzerland, the United States of America and Norway, and the European Union.

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Front-cover photo: **Measuring REDD+:** Local people receive training in measuring tree diameters to estimate carbon stocks in the Meru Betiri National Park, East Java, Indonesia, as part of ITTO project PD 519/08 Rev.1(F). Photo: FORDA.

Back-cover photo: **Species inventory:** Foresters establish a monitoring plot during a national inventory of *Dalbergia* species in Guatemala as part of a project funded by the ITTO–CITES Programme. Photo: R. Martinez/FNPV

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Foreword

ITTO pioneered the development of criteria and indicators (C&I) for sustainable forest management (SFM) in the early 1990s to assist in monitoring and assessing the condition of natural tropical forests in the Organization's producer member countries and in identifying improvements needed in forest practices. ITTO published *Criteria for the Measurement of Sustainable Tropical Forest Management* in 1992 and revised versions in 1998 and 2005.

In addition to its pioneering normative work on C&I, ITTO has provided strong leadership in the implementation of C&I in its producer member countries. ITTO has invested around US$30 million in projects to build the capacity of tropical forest countries to use and apply C&I, and it has convened 28 C&I training workshops attended by participants from 30 ITTO tropical producer member countries; overall, ITTO's investment in C&I is the single-biggest such investment by any international organization. Submissions by ITTO member countries according to the C&I have provided data for two editions of *Status of Tropical Forest Management*, ITTO's periodic survey of forest management in the tropics.

In 2014, ITTO's governing body, the International Tropical Timber Council, decided another comprehensive review was needed to ensure that ITTO's C&I continue to meet the evolving needs of forest stakeholders and to fully inform the development of forest policies and management practices. This revised edition of the ITTO C&I is the outcome of that process. It is timely in light of recent global developments in forest policy, such as those related to climate-change mitigation and adaptation, the Convention on Biological Diversity's Aichi Biodiversity Targets, and the Sustainable Development Goals (SDGs), as well as in view of recent work among C&I processes and the Food and Agriculture Organization of the United Nations (FAO) to streamline and rationalize national reporting on forests. The use of the C&I is voluntary; their purpose is to assist countries in their efforts to achieve SFM and also to help bring consistency to international data.

I have no doubt that this new edition of the ITTO C&I will make an important contribution to forest policy discussions and ITTO's ongoing work, and it will also help member countries in reporting to ITTO and FAO, among others, and in establishing baselines for REDD+ and reporting on the SDGs. I thank all those who contributed to it.

Steve Johnson
ITTO Officer-in-Charge
Yokohama, Japan, August 2016

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Even though he was not directly involved in this revision of the ITTO C&I, ITTO acknowledges the pivotal contributions of Professor Duncan Poore to its work on C&I over the past 30 years. Professor Poore played key roles in the development of all previous versions of the ITTO C&I and had agreed to review this revision prior to his passing in March 2016. ITTO dedicates this version of the C&I to his memory.

Acronyms

C&I	criteria and indicators
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
FAO	Food and Agriculture Organization of the United Nations
FLEGT	forest law enforcement, governance and trade
FLR	forest and landscape restoration
FMU	forest management unit
GDP	gross domestic product
INDCs	intended nationally determined contributions
ITTC	International Tropical Timber Council
ITTO	International Tropical Timber Organization
IUCN	International Union for Conservation of Nature
NAMA	nationally appropriate mitigation action
NTFP	non-timber forest product
PFE	permanent forest estate
REDD+	*See Annex 2*
SFM	sustainable forest management
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
UNFF	United Nations Forum on Forests

1 Introduction

History of C&I, and lessons learned

Criteria and indicators (C&I) for sustainable forest management (SFM) are arguably one of the most important and innovative policy instruments for operationalizing the SFM concept (ITTO 2011). Criteria characterize the essential components of SFM, and indicators are ways of assessing those components. When monitored over time, C&I show changes and trends in the biophysical, socioeconomic and policy conditions relevant to SFM.

Since 1990, nine C&I schemes covering some 150 countries have been established, collectively encompassing all the major ecozones—boreal; temperate; subtropical and tropical dry; and tropical humid. Grainger (2012) provided a critical and comprehensive analysis of the schemes and their strengths and weaknesses.

ITTO pioneered the development of C&I in tropical forests in the early 1990s, publishing the world's first set of criteria for SFM (*Criteria for the Measurement of Sustainable Tropical Forest Management*; ITTO 1992) with the aim of enabling the assessment of the condition of tropical forests in producer member countries and identifying weaknesses in forest practices and the improvements needed. By 2000, based on ITTO's early work and the outcomes of the 1992 Rio Earth Summit, C&I initiatives had been launched worldwide (Caswell et al. 2014), including the Montreal Process (1994) for temperate and boreal forests; the Tarapoto process for the Amazon countries (starting in 1995); *Principles, Criteria and Indicators for the Sustainable Management of African Natural Tropical Forests* (published by the African Timber Organization and ITTO in 1995); and Forest Europe (for European forests), beginning in 1995.

ITTO published *Criteria and Indicators for Sustainable Management of Natural Tropical Forests* in 1998 (ITTO 1998a,b), an updated version of its original criteria (i.e. ITTO 1992) that included manuals for applying the C&I at the national and forest management levels. ITTO published the *Revised ITTO Criteria and Indicators for the Sustainable Management of Tropical Forests including Reporting Format* in 2005 (ITTO 2005), updating the C&I and providing a clear template for a monitoring and reporting format.

Since 2005, significant progress has been made in further developing C&I as policy instruments. The predominant view is that C&I are tools for adapting management over time (rather than an end in themselves) to maintain the health and productivity of forests in the light of changing economic, social and environmental conditions and demand for forest goods and environmental services. Taking this view into account, a conference of interested parties (including ITTO) in 2003 identified "seven thematic areas" of SFM based on the criteria common to the major C&I processes. From 2005, these seven thematic elements have formed the basis and provided the organizing framework for the periodic global forest resources assessments (FRAs) produced by the Food and Agriculture Organization of the United Nations (FAO). They were also ultimately incorporated in the Non-Legally Binding Instrument on All Types of Forests of the United Nations.

Nevertheless, fully applying the ITTO C&I (or any other set of C&I) remains a major challenge for many tropical forest countries, which often lack sufficient capacity, financing, commitment, policy frameworks and stakeholder engagement. For example, all countries are able to collect data on some indicators, but very few can report on all of them. The specific nature and extent of the challenges vary widely by country, too. Some challenges can only be addressed internally by raising the level of priority given to forests in national agendas, taking into account cost-effectiveness and technical feasibility. Other challenges can be overcome through increased international cooperation, public–private partnerships, and collaborative initiatives among countries in particular C&I processes and between the various processes. In many countries, strengthening the capacity to collect

data, report on indicators, and integrate C&I into policies and programmes at an operational level will continue to be important for decision-making on SFM. Existing sets of C&I present challenges for some users. In particular, indicators at the level of the forest management unit (FMU)[1] may benefit from review with respect to their suitability and feasibility for use by local communities and small forest enterprises.

Evolving context of C&I

C&I are playing important roles in a range of forest-related developments and issues, including as a foundation for international initiatives to assess forest governance in the context of REDD+[2] and to establish principles, criteria and indicators for sustainable intensive woodfuel production (FAO 2010). C&I are also relevant to the assessment of forest-related trends pertaining to the Aichi Biodiversity Targets (CBD 2013).[3]

A number of countries apply C&I in national forest carbon calculations and in related efforts to put a value on carbon in the broader context of SFM. C&I frameworks have served as models for developing national environmental indicators and C&I applicable to, for example, rangelands/grasslands, agricultural crops, water and minerals.

The value of C&I in addressing forest-related global challenges is increasingly evident and warrants further attention. The experience and expertise gained in developing and applying the ITTO C&I and other sets of forest-related C&I processes could be valuable in similar initiatives in other fields (Caswell et al. 2014).

Many actors at the national and landscape levels have interests in forests (Figure 1), some of which are compatible and some of which are not. For example, some stakeholders might want to preserve a forest untouched, while others might want to clear it for commercial crops or mineral extraction. Between these two extremes is a wide range of actors with a broad set of forest uses. For them, C&I can help in ensuring that all forest values are accounted for in the management and use of the resource.

Benefits

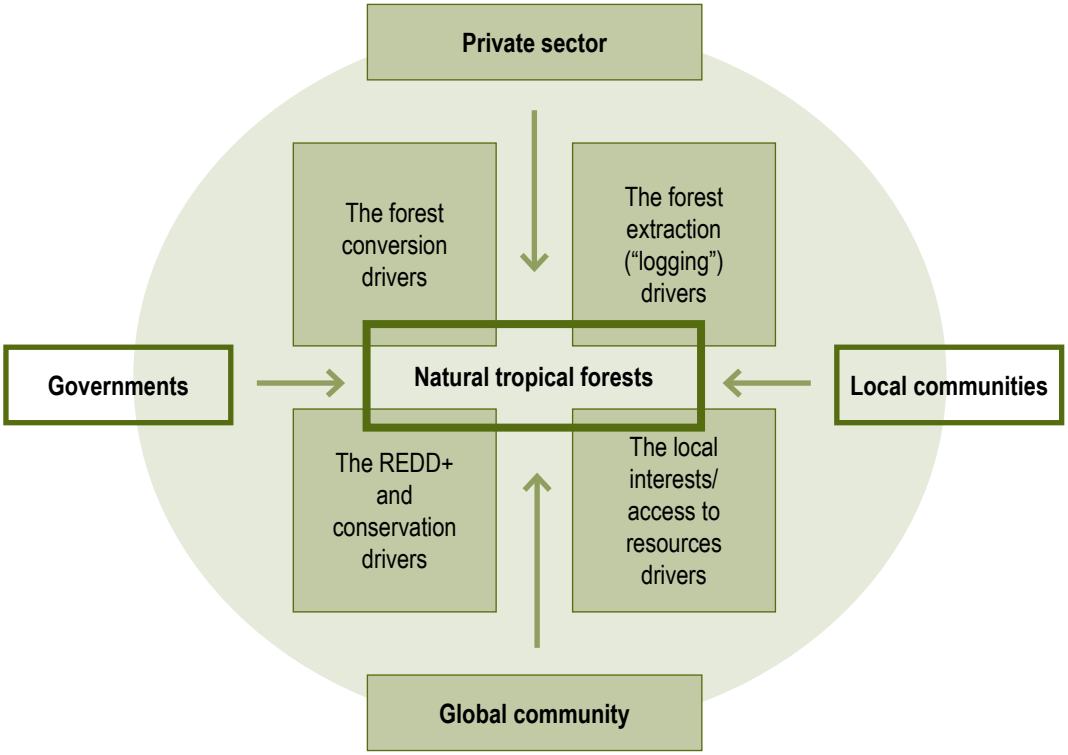
C&I constitute a common policy tool to assist countries in monitoring, assessing and reporting on trends in forest conditions and progress toward SFM at various levels, while allowing for differences within and between countries. Improvements in the quality, coverage and consistency of C&I data in an increasing number of tropical countries has enabled more comprehensive regional and global forest assessments, such as ITTO's reports on the status of tropical forest management (Blaser et al. 2011) and FAO's FRAs. Countries that use C&I for monitoring, assessment and reporting are likely to be well-positioned to respond to external requests for forest-related reporting.

The version of the ITTO C&I presented in this document is designed to address the four objectives of SFM enumerated in the *Voluntary Guidelines for the Sustainable Management of Natural Tropical Forests* (ITTO 2015):

1. providing the enabling conditions for SFM;
2. supporting forest ecosystem health and vitality;
3. maintaining the multiple functions of forests to deliver products and environmental services; and
4. integrating economic, social and cultural aspects in forest management.

1 An FMU is a clearly defined forest area, managed to a set of explicit objectives according to a long-term management plan. See Annex 2 for a glossary of terms used in this document.
2 The term given to the efforts of countries to reduce emissions from deforestation and forest degradation and foster conservation, sustainable management of forests, and enhancement of forest carbon stocks (www.forestcarbonpartnership.org/what-redd).
3 Aichi Biodiversity Targets—see www.cbd.int/sp/targets.

Figure 1: The various sectors with direct influence on the conservation and sustainable management of natural tropical forests



Source: ITTO (2015).

The ITTO C&I provide a logical structure for countries to use in monitoring, assessing and reporting on their progress towards SFM and in reporting to ITTO on the status of tropical forest management (Annex 1).

Sustainable forest management and permanent forest estate

The ITTO C&I have been developed to suit the situations of tropical forest countries. Two key concepts underlie them: 1) SFM to ensure the sustainable supply of forest goods and environmental services; and 2) application in areas destined to remain under forest cover "in perpetuity"—that is, as permanent forest estate (PFE) (ITTO 2015).

In general, **SFM** involves the application of the best-available practices based on current scientific and traditional knowledge that allow multiple objectives and needs to be met without degrading the forest resource (ITTO 2015). SFM also requires effective and accountable governance and the safeguarding of the rights of forest-dependent peoples. Nevertheless, the concept of SFM will change over time in response to the dynamic and evolving needs of society, and this may be partly the reason for the lack of precision in defining it.

SFM embraces the view that forests produce an array of forest products and social (including cultural) and environmental services. SFM therefore supports the **multiple use** of forests. It refers not just to the flow of goods and environmental services but also to maintaining forest ecological processes essential for maintaining ecosystem resilience—which is the capacity of a forest ecosystem to recover following disturbance (Thompson et al. 2009).

An important dimension of SFM is the scale at which it is applied, as discussed below:

- At the **global and national/subnational scales**, the concept of SFM has evolved in the past 20 years as an approach that balances economic, social (including cultural) and environmental management objectives. The guiding objective is to contribute to the management, conservation and sustainable development of forests and to provide for their multiple and complementary functions and uses. The global environmental services provided by forests, such as those related to the carbon cycle and biodiversity, should be addressed at the international level because all people have an interest in their maintenance; global payment mechanisms for such services are being discussed in international fora. Much of the policy development on SFM initiated at the international level, including ITTO's work on C&I and various guidelines, has influenced policies at the global and national levels.
- At the **landscape scale** within a country, the objective of maximizing wood yields has traditionally been overwhelmingly important. The landscape scale affords a means of considering several land-use systems—such as forestry, agriculture and livestock production—in a more integrated manner and for reconciling the varying needs among stakeholders. Growing awareness of the broad role of forests has led to new approaches to SFM that give weight to the full range of economic, social and environmental objectives. At the landscape scale, tradeoffs will usually have to be made in the mix of products, environmental services and values offered by forests. Ideally, such tradeoffs are agreed in a planning process involving all stakeholders and representing a consensus view on what constitutes SFM in a particular landscape within physical and other constraints. Questions to be addressed in such processes include: How much forest do we need or want? What kinds of forests should there be? Where should they be situated? How should they be conserved and managed?
- At **the FMU scale**, SFM has three elements: 1) the management of forests for multiple objectives; 2) achieving a balance among outputs (of goods and environmental services), rather than the maximization of any single one; and 3) designing and implementing management practices compatible with the social and ecological processes that sustain forest resources and ecosystems. The management of forest stands may vary within an FMU and still be compatible with SFM; for example, some stands may temporarily have low or no tree cover, while others at different growth stages may be fully stocked.

In summary, the essential aim of SFM is to maintain and enhance the potential of forests (at all scales) to deliver the goods and environmental services that people and societies require of them over time. Thus, the use of forests should be planned at the national, landscape and FMU scales, and each FMU should be managed sustainably for the purposes for which it is intended in the landscape.

Permanence is a necessary condition for SFM. As defined in ITTO (2005), the PFE comprises land, whether public or private, secured by law and kept under permanent forest cover. It includes land for the production of timber and other forest products, for the protection of soil and water, and for the conservation of biodiversity, as well as land intended to fulfil a combination of these functions.

The production PFE comprises permanently maintained forest areas (natural and planted) in which timber harvesting and other forms of resource use are permitted, subject to certain conditions. The protection PFE comprises permanently maintained natural forest in which such exploitation is generally not permitted. The ITTO C&I are applicable to all these types of PFE, although emphasis is given to production PFE.

Rationale and process for this revision

C&I have helped increase awareness of the benefits of forests beyond the production of timber and fibre. They also point to the importance of governance systems that integrate the economic, social

and environmental values of forests, including through cross-sectoral coordination and the meaningful involvement of stakeholders at all levels. The scope and scale of C&I has widened as forests have become more prominent in international fora such as the Convention on Biological Diversity (CBD) (e.g. the Aichi Biodiversity Targets) and the United Nations Framework Convention on Climate Change (UNFCCC) (and its attention to REDD+). C&I constitute a comprehensive package for accounting for all the functions of forests; they enable a holistic approach to forest management and thereby provide an essential tool for decision-making on forest management.

In 2014, the International Tropical Timber Council decided to initiate a process to comprehensively review and improve the ITTO C&I based on lessons learned and recent developments, taking into account ITTO's *Voluntary Guidelines for the Sustainable Management Of Natural Tropical Forests* (ITTO 2015) and other relevant guidelines, as well as recent updates by other C&I processes; the use of the seven thematic elements of SFM for international reporting; and recent trends in certification and the local control of forests. The Council decided that emphasis should be given to relevant global developments and emerging issues related to, among others, REDD+, the increased use of woodfuel, biodiversity conservation, and the emergence of the bio-economy. Special consideration was to be given to:

- streamlining aspects at the indicator level at the national, landscape and FMU scales;
- the further elaboration of indicators, as appropriate, on forest governance, sustainable woodfuel production, the contribution of forests to the global carbon cycle, and the role of forests in climate-change adaptation; and
- exploring connections among the ITTO, African Timber Organization/ITTO and Tarapoto C&I and the feasibility and merits of enhanced convergence.

Box 1 provides an overview of relevant developments in ITTO that were taken into account in revising the ITTO C&I.

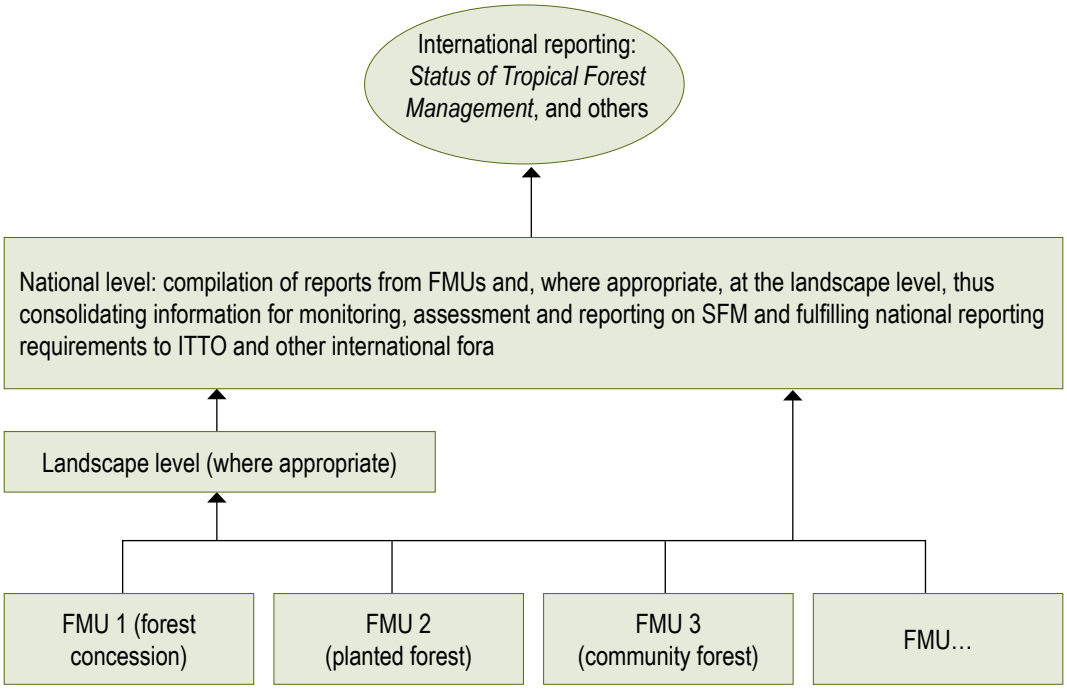
Box 1: Developments on C&I in ITTO since 2002	
2002–2014	Convening of 28 national C&I training workshops attended by 1280 participants from 30 countries in the three tropical regions (Africa, Asia and the Pacific, and Latin America and the Caribbean), and the funding of C&I projects
2003–2005	Development and publication of the *African Timber Organization/ITTO Principles, Criteria and Indicators for the Sustainable Management of African Natural Tropical Forests*
2004–2005	Review and publication of the *Revised ITTO Criteria and Indicators for the Sustainable Management of Tropical Forests, including Reporting Format*
2006, 2011	Publication of ITTO's flagship report, *Status of Tropical Forest Management*, based on national C&I reporting
2002, 2009, 2015	Publication of: • *ITTO Guidelines for the Restoration, Management and Rehabilitation of Degraded and Secondary Tropical Forests* (2002) • *ITTO/IUCN Guidelines for the Conservation and Sustainable Use of Biodiversity in Tropical Production Forests* (2009, a revision of similar guidelines published in 1993) • *Voluntary Guidelines for the Sustainable Management of Natural Tropical Forests* (2015, a revision of similar guidelines published in 1991)

2 A brief explanation of criteria and Indicators

The purpose of criteria and indicators

The ITTO C&I provide tropical forest countries with a tool for monitoring, assessing and reporting on changes and trends in forest conditions and management systems at the national/subnational[4] and FMU levels. C&I identify the main elements of SFM at the jurisdictional levels applicable in a country, thereby providing a means of assessing progress towards SFM. The ITTO C&I, therefore, can be used for monitoring, assessing and reporting on the production and protection of goods and environmental services in all types of tropical forests, both natural and planted, and for addressing the needs of specific stakeholder groups in tropical countries. Figure 2 schematizes the use of C&I.

Figure 2: The use of the ITTO C&I as a tool for monitoring, assessment and reporting on sustainable forest management at the national level



The information generated through the use of the ITTO C&I helps in communicating the status of SFM and efforts to achieve it. It assists countries in developing strategies for SFM as well as for REDD+, forest law enforcement, governance and trade (FLEGT) and forest and landscape restoration (FLR) initiatives. The C&I enable the identification of research and development needs in areas where knowledge is deficient, as well as weaknesses in the implementation of SFM. They assist in improving policies and strategies for SFM and in identifying the need for international assistance and cooperation.

The ITTO C&I are designed as a framework, within which each country can develop its own system for determining sustainability at the national and FMU levels. C&I are an evolving concept and therefore need periodic review and refinement in the light of experience and changing economic, social and environmental conditions. Such revision should take into account new knowledge on the functioning of tropical forest ecosystems, the vulnerability of forests to natural hazards, the human impacts on forests (planned and unplanned), and the ever-changing needs of society for forest goods

4 Subnational where appropriate, such as in countries with federal governmental structures.

and environmental services. Moreover, the capacity to measure indicators, and their technical, financial and political feasibility, will change over time, and knowledge will improve on the "best" indicators with which to assess, monitor and report on tropical forest management.

The criteria

C&I reflect a holistic approach to forests as a landscape component providing multiple benefits. Criteria are the essential elements of SFM and indicators are ways of measuring them. The development of criteria common to the various C&I processes globally led to the identification of "seven thematic elements of SFM", which ultimately were incorporated in the Non-Legally Binding Instrument on All Types of Forests of the United Nations.

Box 2: Criteria and indicators for sustainable forest management

A criterion is defined as an aspect of forest management that is considered important and by which SFM may be assessed. A criterion accompanied by a set of related indicators describes a state or situation that should be met to comply with SFM.

The ITTO C&I specify **seven criteria** as essential elements of SFM. Criterion 1, "Enabling conditions for sustainable forest management", is concerned with the general legal, economic and institutional framework, without which actions included under the other criteria will not succeed. Jointly with Criteria 2, "Extent and condition of forests", Criterion 1 provides the necessary information to assess the enabling conditions for SFM. Criterion 3, "Forest ecosystem health and resilience", is concerned with the risk to forests posed by destructive agents and stresses. Criteria 4, "Forest production", Criterion 5, "Forest biological diversity", and Criterion 6, "Soil and water protection", are concerned with maintaining the multiple functions of forests to deliver products and environmental services. Criterion 7, "Economic, social and cultural aspects", addresses the economic, social and cultural values of forests and the extent to which forest management maintains those values, for example by adherence to social safeguards established in national and international financing mechanisms.

The order of presentation of the criteria does not indicate priority or relative importance. Annex 1 presents the seven ITTO criteria schematically.

The indicators

An indicator is a quantitative, qualitative or descriptive attribute that, when measured and monitored periodically, indicates the direction of change in a criterion. Indicators identify the information needed for assessing and monitoring change, both in the forest itself (outcome indicators) and as part of the environmental and forest management systems used (input and process indicators). A time series of the values of any measurable or clearly descriptive indicator can provide information on the direction of change, either towards or away from SFM. The indicators cannot by themselves establish the sustainability of management, however.

The indicators presented in this document have been identified and refined based largely on the information received in the 28 C&I national workshops convened by ITTO from 2002 to 2014. The measurement of any one of these indicators over time will provide information that is both necessary and significant in assessing progress towards SFM. The indicators have been defined so they are clear and practical to monitor; to the greatest extent possible, they are based on available knowledge and data.

It is clear, however, that information is not readily available for all indicators in any given country. Where data are lacking, a self-rating system for assessing data quality (e.g. "high", "medium" or "low") at the indicator level could be used in national C&I reporting systems, where a rating of "low" data quality might exclude such data from ITTO's aggregated reporting.

Countries face a considerable burden in reporting on various aspects of forest management to different international organizations. This burden can be minimized by ensuring that institutions (e.g. the CBD; FAO; ITTO; the United Nations Convention to Combat Desertification—UNCCD; the UNFCCC; and the United Nations Forum on Forests—UNFF) coordinate their requests for forest-related data. To the greatest extent possible, the indicators described in this document have been selected for their compatibility with internationally agreed standards and definitions. If the indicators are to give an accurate picture of trends, it is important that comparable methods are used between one assessment and the next and that there is a way of estimating the accuracy of the data presented. Ideally, the same methods of measurement and assessment will be used over time, but data collection and analysis techniques are dynamic: for example, the measurement of forest extent and quality using remote sensing and geographic information systems is evolving quickly. Moreover, certain forests are monitored independently (e.g. under forest certification schemes) and can provide valuable new inputs to official reporting. In each C&I report, therefore, countries should describe the methods used, estimate the accuracy of the data, and indicate any difficulties encountered in collecting or analyzing the data.

Levels of application of the ITTO C&I

This document provides C&I for the national/subnational scale, the landscape scale (where appropriate), and the local (FMU) scale. Although the overall sustainability of a nation's forests depends substantially on actions taken at the national scale (such as macro-scale decisions on land uses and, within the PFE, between production and conservation), analysis at the FMU scale is the key to assessing, monitoring and reporting on SFM. Experience in data collection in the last decade suggests that, in many tropical countries, issues remain with respect to the provision or reliability of data obtained from FMUs. In principle, the national-level analysis of indicators may involve the aggregation of data collected at the FMU scale. The wide variability in the size and administrative or ownership structures that commonly apply to FMUs, however, means that the validity of such aggregation varies greatly. It is important, therefore, that countries provide clear descriptions of their approaches to defining FMUs, the variability in size of the FMUs, and their governance arrangements (e.g. concessions, government enterprises, community forests or private forests, or a mix of these).

All criteria are valid at the national, landscape and FMU scales. The level at which an indicator applies is denoted in this document by ✓✓ if fully applicable, ✓ if partially applicable, and ✗ if not applicable. Nevertheless, the levels at which specific indicators are applicable may vary between countries. In reporting against the ITTO C&I, therefore, countries should provide relevant information at what they judge are the most appropriate levels in their contexts and provide explanations as necessary.

Cross-references are provided for each indicator to indicate where information might be available beyond the local, subnational and national sources used to describe the indicator. Such references are incomplete and might become outdated. It is expected that countries using C&I for monitoring SFM will specify and update such references over time.

Annexes, terms and definitions

Annex 1 of this document outlines the concept of the seven criteria and the links between the ITTO C&I and ITTO's technical guidelines on various aspects of SFM. Annex 2 presents definitions of the main terms used in this document—a clear understanding of terms such as FMU, PFE, SFM and resilience is essential for the application of the ITTO C&I. If the definitions used in any reporting country differ from those in Annex 2, those definitions should be provided, with references. Annex 3 lists the protected-area management categories of the International Union for Conservation of Nature (IUCN), and Annex 4 refers to the IUCN Red List categories and criteria. Annex 5 provides an overview of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendices, and Annex 6 classifies terms as they relate to ownership and management rights in forests. An electronic "fillable" version of this document is available at www.itto.int.

Linking SFM objectives, principles of natural tropical forest management and C&I

Table 1 summarizes the interrelationship between the ITTO criteria, the four objectives of SFM enumerated in the *Voluntary Guidelines for the Sustainable Management of Natural Tropical Forests* (ITTO 2015), and the principles for managing tropical forests.

Table 1: The ITTO C&I as they relate to the management of tropical forests

SFM objective	Criterion	Principles for managing tropical forests	
		Principle	Observations
1. Providing the enabling conditions for SFM	**Criterion 1: Enabling conditions for SFM** **Criterion 2: Extent and condition of forests**	Principle 1: Forest governance and security of tenure	Political commitment, supportive national policies, strong institutions, laws and regulations, appropriate governance, security of forest tenure and clearly defined access and use rights, including customary and traditional rights, are all necessary conditions for SFM
		Principle 2: Land-use planning, permanent forest estate and forest management planning	Managing tropical forests sustainably requires that land allocation and spatial planning within and outside forests maintain or enhance the economic, social and environmental values of forests at a landscape scale. This requires the adoption of a forest planning framework at the national, subnational or landscape scale
2. Ensuring forest ecosystem health and vitality	**Criterion 3: Forest ecosystem health and resilience**	Principle 3: Ecological resilience, ecosystem health and climate-change adaptation	Resilience is a key tenet of SFM in tropical forests; it is essential that it is maintained or enhanced to reduce risks to sustainability. Climate change is likely to affect tropical forests and the people who depend on them. It is essential to identify, prevent, monitor and manage threats to forests and to protect them from destructive agents and stresses. There is a close interrelationship between criteria 3 and 5
3. Maintaining the multiple functions of forests to deliver products and environmental services	**Criterion 4: Forest production** **Criterion 5: Forest biodiversity** **Criterion 6: Soil and water protection**	Principle 4: Multipurpose forest management Principle 5: Silvicultural management	The role of tropical forests as providers of multiple goods and environmental services should be safeguarded by the application of sound planning and management practices that maintain or enhance ecosystem functions and the potential of the forest to yield the full range of benefits to society. In timber production forests, it is essential to have an approved management plan with clearly stated objectives and the silvicultural measures required to help meet those objectives
4. Integrating social, cultural and economic aspects to implement SFM	**Criterion 7: Economic, social and cultural aspects**	Principle 6: Social values, community involvement and forest-worker safety and health Principle 7: Investment in forest management and economic instruments	SFM needs to accommodate forest-based production (particularly of timber), environmental protection and local development concerns. Natural tropical forests in particular perform a wide range of socioeconomic and cultural functions, which must be recognized and maintained

Source: Modified from ITTO (2015).

3 ITTO criteria and indicators for the sustainable management of tropical forests

The ITTO C&I for the sustainable management of tropical forests, as revised in this document, comprise seven criteria, 18 indicator groups that subdivide the criteria, and 58 indicators.

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 Multiyear 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

4 C&I monitoring, assessment and reporting format

Criterion 1: Enabling conditions for sustainable forest management

The necessary enabling conditions for SFM at all scales—national/subnational, landscape and local (FMU)—are political commitment and supportive policies, laws and regulations; conducive economic and financial conditions; appropriate institutions and adequate and equitable governance; adequate and secure forest tenure, access and use rights, including customary and traditional rights; and appropriate planning, monitoring and reporting frameworks.

A technician working for ITTO project RED-PD 045/11 Rev.2 interviews a farmer in Veracruz, Mexico, as part of an assessment of the value of forest environmental services. The participation of local stakeholders is an important aspect of SFM. Photo: C. Ramirez/INECOL

Policy, legal and governance framework: indicators 1.1–1.3

Forests, especially those in the PFE, should be secured, protected and managed in accordance with best management practices involving all stakeholders, in particular indigenous peoples and local communities dependent on forests.

Indicator 1.1 **Policies, laws and regulations for governing forests**	National level	FMU level	Landscape level[1]
	✓✓	✓	×
Proposed monitoring and reporting format			
Framework governing:	***Policies***	***Laws***	***Regulations***
a) National SFM objectives, including production, protection and investment			
b) Mechanisms for cross-sectoral policy coordination			
c) Establishment and security of the PFE			

1 ✓✓ = fully applicable; ✓ = partially applicable; × = not applicable.

Continued next page

Indicator 1.1 (*continued from previous page*)

Proposed monitoring and reporting format			
Framework governing:	***Policies***	***Laws***	***Regulations***
d) Forest tenure and associated rights			
e) Participation of local communities and other stakeholders in forest management			
f) Control of forest management operations			
g) Control of illegal activities in forest areas			
h) Health and safety of forest workers			

Notes
- List all relevant policies, laws and regulations
- For each policy, law and regulation, give a brief description of any sections relevant to a) through h)
- List significant gaps in the coverage of policies, laws and regulations (taking into account a) through h)
- List significant changes made to laws, policies and regulations since the previous report

Cross-references
ITTO (2015), Principle 1; Blaser et al. (2011) and other editions of *Status of Tropical Forest Management*; Convention No. 169 of the International Labour Organization; UN Declaration on the Rights of Indigenous Peoples; UNFF reporting

Indicator 1.2 **Forest tenure and ownership**	National level	FMU level	Landscape level[1]
	✓✓	✓	×

Proposed monitoring and reporting format		
Class	***Category***	***Area (ha)***
PFE	**Publicly owned** – State (including subnational states or provinces, where applicable), including share designated as leasehold – Municipal/communal or public associations – Other public *[please specify]*	
	Privately owned – Private investment firms – Foundations – Private associations of smallholders, communities – Individuals/families	
	Indigenous-owned	

Continued next page

Indicator 1.2 (*continued from previous page*)

Proposed monitoring and reporting format

Class	***Category***	***Area (ha)***
Non-PFE	**Publicly owned** – State (including subnational states or provinces, where applicable), including share designated as leasehold – Municipal/communal or public associations – Other public *[please specify]*	
	Privately owned – Private investment firms – Foundations – Associations of smallholders, communities – Individuals/families	
	Indigenous-owned	

Notes

- Indicate the specific tenure and ownership situation according to the country's legal context
- Where applicable, specify differences between land and tree ownership, and forest carbon ownership
- Distinguish between natural and planted forest

Cross-references

FAO (2015); Rights and Resources Initiative tenure data (www.rightsandresources.org/en/resources/tenure-data)

Indicator 1.3 **Forest governance**	National level	FMU level	Landscape level
	✓✓	×	×

Proposed monitoring and reporting format

Questions to characterize the indicator	***Yes/No***	***Further information***
a) Does the forest law include a specific statement that constitutes the national (or subnational, where applicable) policy for, or objective of, SFM?		
b) Are the laws governing the use of forest resources consistent and clear?		
c) Do laws recognize traditional and indigenous rights to forest resources?		
d) Are there mechanisms in government to address forest-related policies and implementation cross-sectorally?		
e) Does the law protect non-marketed goods and services (e.g. ecosystem integrity, water quality, cultural resources)?		
f) Are stakeholders able to provide input to the creation of forest policies, public forest management plans and subsidiary rules?		
g) Are inventory data, management plans, laws and budgets for state-owned forests easily accessible to the public?		

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Indicator 1.3 (*continued from previous page*)		
Proposed monitoring and reporting format		
Questions to characterize the indicator	***Yes/No***	***Further information***
h) Is the collection, sharing and redistribution of forest taxes, royalties, charges and rents effective?		
i) Does the administration's effort to combat forest crimes encompass the whole forest supply chain (transport, processing and trade)?		
j) Do serious conflicts exist between the state and stakeholders that interfere with forest use?		
k) Does the public have opportunities to report corrupt practices to appropriate authorities?		
l) Are there regular audits of the forest agencies, and is action taken on the findings?		
m) Do communication strategies and feedback mechanisms exist to increase awareness of SFM?		
Notes • Based on national consultation processes as appropriate		
Cross-references ITTO (2015), Principle 1; PROFOR Forest Governance Toolbox		

Institutional framework: indicators 1.4 and 1.5

Appropriate and capable institutions with effective linkages between them are essential for SFM. Well-organized implementing agencies and research and educational institutions with sufficient appropriately trained personnel are needed to ensure that forests are managed in accordance with scientific, technical, socioeconomic and traditional knowledge.

Indicator 1.4 **Institutions responsible for, and supportive of, forest management**	National level	FMU level	Landscape level
	✓✓	✓	×
Proposed monitoring and reporting format			
Institutions	***Name***	***Nature of responsibilities***	
Primary ministry in charge for forest management			
Other public *[please specify]*			
Semi-public (e.g. public enterprises)			
Supporting			
Other *[please specify]*			

Continued next page

Indicator 1.4 (*continued from previous page*)

Notes

- Describe public institutions (e.g. forest agencies and enterprises) with primary responsibilities for forest management, wildlife resources, REDD+, etc.
- "Other" institutions may include, for example, ministries and public agencies dealing with aspects relevant to forest management, such as environment, energy and water; educational, training and research organizations; private-sector organizations (e.g. producer organizations); civil-society organizations; the informal sector; and financial and investment institutions

Cross-references

Blaser et al. (2011) and other editions of ITTO's *Status of Tropical Forest Management* reports; FAO (2015); FAO (2014a) and other editions of FAO's *State of the World's Forests*; FAO policy papers; PROFOR policy briefs

Indicator 1.5 **Availability of professional and technical personnel to perform and support forest management**	National level	FMU level	Landscape level
	✓✓	✓✓	×

Proposed monitoring and reporting format

Category of personnel	***Public [number]***	***Private [number]***
Forest management		
Professionals in forest management (university-educated/technical)		
Trained forest workers in forest management		
Forest-based research and forest-based education		
Others *[please specify]*		
TOTAL		
Downstream forest product industries and trade		
Professionals (university-educated/technical)		
Trained workers		
Other indirect employment *[please specify]*		
TOTAL		

Notes

- Forest management encompasses forest management planning, the implementation of forest management plans, and monitoring, assessment and reporting, including administrative duties
- As per Indicator 1.4, "public" comprises the primary ministry in charge of forest management, semi-public institutions, and those public institutions listed in "other"; it also encompasses forestry administration, research and education
- "Private" includes forest concessions, private operations, professional organizations, non-governmental organizations, etc.

Cross-references

FAO (2015); data from the International Labour Organization (www.ilo.org/global/statistics-and-databases)

Planning and monitoring framework: indicators 1.6–1.9

Planning is needed at the landscape scale—that is, over areas large enough to be resilient in the face of environmental change and to maintain ecological integrity. Landscape-scale planning is essential for the sustainable management of natural resources, including forests, and it requires coordinated interinstitutional action and the participation of diverse stakeholders. Planning for SFM thus needs an adequate framework, combined with the use of appropriate technologies and effective monitoring and control.

Indicator 1.6 **Integration of forests in national and subnational land-use planning**	National level	FMU level	Landscape level
	✓✓	✓	✓✓
Proposed monitoring and reporting format			
Land-use policies and planning			
Notes • Describe the mechanisms used to formulate land-use policies aimed at the conservation and sustainable use of natural resources, including land, soils, forests and water • Describe the extent to which SFM planning is part of landscape-level planning • Describe how multiple-use forest management is integrated into wider land-use planning • List the major constraints encountered in the integration of forests in land-use planning			
Cross-references World Bank sector analysis strategies (www.worldbank.org/en/projects-operations/country-strategies)			

Indicator 1.7 **Capacity and mechanisms for management planning and the periodic monitoring of implementation**	National level	FMU level	Landscape level
	✓✓	✓✓	×
Proposed monitoring and reporting format			
Capacity and mechanisms			
Notes • Describe the mechanisms used for planning SFM (including periodic monitoring, evaluation and feedback on progress) • Describe how periodic national and subnational forest resource assessments are carried out and how data are used • Describe how multiyear forest management plans are developed and used for management planning at the FMU level • Describe the capacity available and the institutions responsible for management planning and monitoring • List the major constraints encountered in management planning and monitoring			
Cross-references FAO (2015)			

Indicator 1.8 **Long-term projections, strategies and plans for production PFE and protection PFE**	National level	FMU level	Landscape level
	✓✓	×	✓✓
Proposed monitoring and reporting format			
Production PFE (including expanded use of planted forest)	*[Textual response, if possible with estimates in hectares]*		
Protection PFE (including expanded use of planted forest for protection purposes)	*[Textual response, if possible with estimates in hectares]*		
Notes • Describe projections (five years and beyond), strategies or plans for production (including expanded use of planted forest) to bring the management of harvesting practices and patterns into alignment with SFM objectives and forest protection, based on categories as described in annexes 3, 4 and 5			
Cross-references FAO (2015); FAO (2014a) and other editions of FAO's *State of the World's Forests*; national REDD+ strategies; Aichi Biodiversity Targets			

Indicator 1.9 **Stakeholder participation in land-use and forest management planning, monitoring and assessment**	National level	FMU level	Landscape level
	✓✓	×	✓✓
Proposed monitoring and reporting format			
List the institutions responsible for stakeholder participation in land-use management planning			
Describe the processes of stakeholder participation, indicating the parties involved and their levels of involvement			
Describe any improvements proposed and any constraints to their introduction			
Notes • List the institutions responsible for stakeholder participation in land-use management planning at the landscape scale (for small countries, this may also be the national level)			
Cross-references ITTO (2015), Principle 2; Rights and Resources Initiative (2015); REDD+ readiness: FCPF (2013); UNEP (2014)			

Economic framework: indicators 1.10 and 1.11

One of the most important requirements for achieving SFM is the availability of financial resources (e.g. grants, concessional funding and loans) and the provision of incentives and appropriate economic instruments that promote and support SFM. Capturing the full value of forests, including forest products and environmental services, and ensuring the equitable distribution of costs and benefits, are essential for SFM.

Indicator 1.10 **National, subnational and international public and private funding committed to SFM**	National level	FMU level	Landscape level
	✓✓	×	×
Proposed monitoring and reporting format			
Source	*Amount (US$'000)*	*Comment (including reference year)*	
Government sources - National government - Subnational government			
International aid partners - Grant - Loan			
Private sources - Domestic - Foreign			
Notes • Provide the exchange rate if reported in national currency • Indicate if funding is annual or multiyear budget			
Cross-references Collaborative Partnership on Forests Sourcebook; REDD+ financing reporting; Matta (2015); statistics of the International Finance Corporation; Forest Trends reporting on international private funding in forestry/REDD+			

Indicator 1.11 **Incentives to encourage SFM**	National level	FMU level	Landscape level
	✓✓	×	×
Proposed monitoring and reporting format			
Assess and briefly describe the framework conditions (e.g. legal, policy, institutional) to attract investments in forestry			
Are economic instruments and other incentives being implemented to encourage SFM?			
• If yes, give the name of each economic instrument/ incentive, a short description and explanation of how it is used, and the main institution(s) and mechanism(s) responsible for its implementation			
Existence of a forest fund to support SFM (natural forests, planted forest). Specify the yearly amount and the major use			
Notes • Incentives to encourage SFM include financial instruments, such as national/bilateral /multilateral aid/financing/grants/loans/subsidies; financial guarantees; differential/preferential interest rates; tax reductions; and transfer/compensation payments. They also include other kinds of economic incentive, such as capacity development; market commitment; preferred market access (e.g. FLEGT); market recognition (e.g. forest certification); risk mitigation; value adding; recognition and/or restitution of use (tenure/traditional) rights; and gains in efficiency and/or effectiveness			
Cross-references Collaborative Partnership on Forests Sourcebook; Matta (2015)			

Criterion 2: Extent and condition of forests

SFM is a long-term enterprise that depends on the stability and security of the PFE. This criterion lays the foundation for SFM within a well-planned distribution of production and protection forests. It considers the extent and percentage of land under natural and planted forests and the wider context of land-use planning, the need for the conservation of biodiversity and soil and water protection through the maintenance of a range of forest types, and the integrity and condition of forest resources.

Field officers conduct a forest inventory in the Kabaung Reserved Forest, Myanmar, as part of activities under ITTO project RED-PD 038/11 Rev.3 (F). Good information about the extent and condition of forests is essential for SFM. Photo: Myanmar Forest Department

Extent and condition of forests: indicators 2.1–2.8

Indicator 2.1 **Extent and percentage of total land area under comprehensive land-use plans**	National level	FMU level	Landscape level
	✓✓	✓	✓✓

Proposed monitoring and reporting format		
Description/title of land-use plan	*Total area (ha)*	*Comment*

Notes
- Provide the area and percentage of the total land area under comprehensive land-use plans; specify the area classified as PFE in the land-use plan
- Describe the processes for undertaking land-use/landscape planning
- Indicate new trends in land-use planning (e.g. REDD+ and forest-related "Nationally Appropriate Mitigation Actions"—NAMAs)

Cross-references
FAO (2015); Blaser et al. (2011) and other editions of ITTO's *Status of Tropical Forest Management* reports

Indicator 2.2 **Extent of forests committed to production and protection**	National level	FMU level	Landscape level
	×	✓✓	×

Proposed monitoring and reporting format

	Dedicated to:	
	Wood (and non wood forest product) production (ha)	Forest protection (ha)
Natural forest		
- PFE		
- Non-PFE*		
Planted forest		
- PFE		
- Non-PFE*		
Area of PFE with boundaries physically demarcated		

Notes
- *Countries lacking a PFE should complete the non-PFE row
- Indicate reference year and source
- Indicate the area of privately held forest in the PFE
- Indicate the extent and boundaries of the PFE that are uniquely identified, registered and formally recognized

Cross-references
FAO (2015); Blaser et al. (2011) and other editions of ITTO's *Status of Tropical Forest Management* reports

Indicator 2.3 **Extent and percentage of total land area under each forest type**	National level	FMU level	Landscape level
	×	✓✓	×

Proposed monitoring and reporting format

Forest type	*Total forest (ha)*	*%*	*Part of PFE (ha)*	*Part of non-PFE (ha)*
Total		**100**		

Notes
- Describe the forest (ecological) type classification used. Include azonal (non-climax) forest types (e.g. mangroves, swamp forests, limestone forests and saline forests)
- Classifications of forest types based on species composition are more useful than those based on forest structure

Cross-references
FAO (2015) based on the classification of the World Conservation Monitoring Centre; Iremonger and Gerrand (2011); WWF ecoregions (Based on Olson et al. 2001)

Indicator 2.4 **Multiyear forest management plans in FMUs**	National level	FMU level	Landscape level
	×	✓✓	×
Proposed monitoring and reporting format			
	Total forest (ha)	*PFE (ha)*	*Non-PFE (ha)*
Production forests: natural forests and natural regeneration forests, including protected areas in production forests) - Number of management plans - Area (ha)			
Production forests: planted forests - Number of management plans - Area (ha)			
Protected forests (including for soil, water and biodiversity) - Number of management plans - Area (ha) - Purpose of protection			
Describe the effectiveness of implementation of forest management plans. How is implementation monitored?	*[Textual response]*		
Notes • Management plans include multiyear multipurpose forest management plans to manage forest products and environmental services in natural forest areas and forest management plans in planted forests for any purpose • Please indicate the year(s) to which data apply			
Cross-references Blaser et al. (2011) and other editions of ITTO's *Status of Tropical Forest Management* reports; national data; FAO (2015)			

Indicator 2.5 **Forest area in compliance schemes**	National level	FMU level	Landscape level
	✓✓	✓✓	✓✓

Proposed monitoring and reporting format		
	Total forest (ha)	*Comments*
Forest management certification - Natural forests, including natural regeneration forests - Planted forests		
Other legality assurance system		*[Please specify]*

Notes
- See definitions of "natural" and "planted" forests in Annex 2
- Natural forest may include assisted natural regeneration, including the second generation of initially planted trees
- Specify the forest management certification schemes in place
- Indicate the year(s) to which data apply

Cross-references
Forest Stewardship Council website (ic.fsc.org); Programme for the Endorsement of Forest Certification website (www.pefc.org); ITTO Market Information Service (www.itto.int/market_information_service)

Indicator 2.6 **Change in forested area**	National level	FMU level	Landscape level
	✓✓	×	✓✓

Proposed monitoring and reporting format			
	Total forest (ha)	*PFE (ha)*	*Non-PFE (ha)*
Forest area legally converted to agriculture since previous report *[please give year span]*			
Forest area legally converted to settlements and infrastructure since previous report *[please give year span]*			
Forest area legally converted for other purposes *[please specify]* since previous report *[please give year span]*			
Area legally converted to forests since previous report *[please give year span]*			
Estimated forest area deforested illegally since previous report *[please give year span]*			

Continued next page

Indicator 2.6 (*continued from previous page*)

Proposed monitoring and reporting format

	Total forest (ha)	*PFE (ha)*	*Non-PFE (ha)*
Forest area added since previous report *[please give year span]:* - Planted forest (afforestation) - Natural regrowth (as available)			

Notes
- Differentiate, if possible, between PFE and non-PFE
- To the extent possible, the period for which change is reported should immediately follow the period covered in the previous report

Cross-references
REDD+ reporting; FAO (2015)

Indicator 2.7 **Forest condition**	National level	FMU level	Landscape level
	✓✓	×	✓✓

Proposed monitoring and reporting format

	Total area (ha)	***PFE (ha)***	***Non-PFE (ha)***
Undisturbed/unmanaged natural forest			
Managed natural forest			
Degraded natural forest			
Secondary forest (successional forest)			
Degraded forest lands presently unstocked			

Notes
- See definitions in Annex 2 and ITTO (2015)
- Undisturbed natural forests are forests without visible disturbances by humankind

Cross-references
ITTO (2002); Bonn Challenge (www.bonnchallenge.org); national REDD+ strategies

Indicator 2.8 **Forest carbon stock**	National level	FMU level	Landscape level
	✓✓	×	×
Proposed monitoring and reporting format			
Reference year:	*Carbon stock in total forest area ('000 tonnes)*	*Carbon stock in PFE ('000 tonnes)*	*Carbon stock in non-PFE ('000 tonnes)*
Aboveground			
Belowground			
All five carbon pools			
Indicate the area of "total forest" (ha)			
Describe the method of measurement/formula applied			
Notes • The five carbon pools in forests are: 1) aboveground biomass; 2) belowground biomass; 3) dead wood; 4) litter; and 5) soil organic matter			
Cross-references Intergovernmental Panel on Climate Change Best Practices; formula in Chave (2005); Winrock (2012)			

Criterion 3: Forest ecosystem health and resilience

Natural tropical forests and planted forests can be affected by a variety of human actions, such as encroachment, illegal harvesting, human-induced fire, pollution and contamination, animal grazing, mining, poaching, invasive species and the spread of pests. Forests are also affected by natural phenomena, such as extreme weather events (e.g. severe winds, heavy rainfall, flooding and drought), wildfire, and pests and diseases. SFM requires attention to forest health, which may include restoring vulnerable and degraded forests and taking measures to increase the resilience of forest ecosystems.

Addressing threats to, and vulnerabilities of, forests: indicators 3.1–3.3

There is concern in tropical countries about the impacts of climate change and climate variability on forest health. Approaches are needed to monitor the threats to, and vulnerability of, forest ecosystems. Specific management practices may be required to monitor damage, keep abreast of emerging threats, and determine when interventions are necessary.

SFM requires attention to forest health. Photo: Sarawak Forestry Department

Indicator 3.1 **Threats to forests caused directly by human activities**	National level	FMU level	Landscape level
	✓✓	✓✓	✓✓

Proposed monitoring and reporting format				
List the five major direct human threats on forests (in particular in the PFE)				
Direct human threats on forests	*Area affected (ha)*	*Control procedures*	*Area of control (ha)*	*Estimated effectiveness*
1				
2				
3				
4				
5				

Continued next page

Indicator 3.1 (*continued from previous page*)	
Describe the extent and nature of forest encroachment, degradation and disturbance caused by humans and the control procedures applied	
List the invasive species observed in forests, identify the species of greatest concern, and indicate the measures undertaken to control invasive species	

Notes
- If appropriate, indicate the institutions responsible for implementing control procedures
- In "estimated effectiveness", list constraints in implementing control procedures and any proposed improvements

Cross-references
ITTO (2002); Thompson et al. (2013)

Indicator 3.2 **Vulnerability of forests to natural disturbances**	National level	FMU level	Landscape level
	✓✓	✓✓	✓✓

Proposed monitoring and reporting format

List the five most important natural disturbances that make forests vulnerable

	Major natural disturbances	*Area affected (ha)*	*Control procedures*	*Area of control (ha)*	*Estimated effectiveness*
1					
2					
3					
4					
5					

Describe the causes of the enumerated natural disturbances and the remedial actions taken to reduce the vulnerability of forests to biotic and abiotic stresses	*[Textual response]*
Describe the steps taken to strengthen the capacity of forest managers to address new and emerging issues affecting the health and resilience of forests	*[Textual response]*

Notes
- Indicate the extent and nature of forest degradation and disturbance due to natural causes and the control procedures applied
- Indicate the institutions responsible for implementing control procedures
- List the constraints in implementing control procedures and any proposed improvements

Cross-references
FAO (2013); ITTO (2015), Principle 3

Indicator 3.3 **Forest resilience and climate-change adaptation**	National level	FMU level	Landscape level
	×	×	✓✓

Proposed monitoring and reporting format		
	Yes/No	*Comment*
Are climate-related trends known and monitored in the forest area?		
Are the frequency and severity of climate-change-related impacts on natural and planted forests being monitored?		
Are studies available to assess impacts on forests (natural and planted forests)?		
Have short and long-term climate-related risks been assessed?		
Do forest management plans in natural forests and afforestation plans describe measures to address the resilience of trees and forest ecosystems?		
Are adaptation measures being applied in forest management planning to address vulnerability and resilience?		
Describe research work being undertaken (e.g. on species genetics; droughts; forest fire)	*[Textual response]*	

Notes
- In comments, indicate any differences between natural and planted forests in the approach taken

Cross-references
CIFOR (2008); FAO (2013)

Restoration of degraded forests and lands: indicators 3.4 and 3.5

FLR is an emerging approach that encourages the involvement of stakeholders in all affected land-use sectors as well as participatory decision-making. The objective of FLR is to restore degraded landscapes to a healthy and productive state in order to fulfil the needs of people and the environment in a sustainable fashion. FLR makes use of collaborative approaches to harmonize the land-use decisions of stakeholders with the aims of restoring ecological integrity, forest resilience and economic productivity and enhancing the socioeconomic development of local communities.

Indicator 3.4 **Degraded forests and landscapes restored**	National level	FMU level	Landscape level
	✓✓	×	✓✓

Proposed monitoring and reporting format		
	Yes/No	*Comment*
Have there been efforts to assess the degree of forest degradation at the landscape level and to identify restoration opportunities?		
Has a baseline study been conducted to assess the causes of degradation?		
Are field-level FLR activities being conducted? If yes, please indicate the area involved and describe the measures taken		
Are local stakeholders involved in the development of restoration strategies and their implementation? If yes, please describe such involvement		
Are local stakeholders involved in the participatory monitoring of landscape restoration activities?		
Has a national/subnational forest restoration strategy/plan been formulated?		
• If yes, is the strategy/plan being implemented?		
– If yes, what is the scale and timeframe of the effort, and what percentage of area has been restored in recent (e.g. previous three) years?	*[Textual response]*	

Cross-references
ITTO (2002); Global Partnership on Forest and Land Restoration (www.forestlandscaperestoration.org); the World Resources Institute's Global Restoration Initiative; the Restoration Opportunities Assessment Methodology (ROAM)—IUCN and World Resources Institute (2014)

Indicator 3.5 **Area of formerly degraded forest or forest land restored**	National level	FMU level	Landscape level
	✓✓	×	✓✓

Proposed monitoring and reporting format		
	Area (ha)	*Comment*
Total area restored (3-year period) *[please indicate applicable years]*		
Total area restored through natural regeneration/combination of enrichment (3-year period) *[please indicate applicable years]*		
Total area restored through plantations, including in agroforestry systems (3-year period) *[please indicate applicable years]*		

Notes
- Where possible, indicate the area of forest land restored with planted forests and woodlots, the area of forest land restored though (assisted) natural regeneration, the area of degraded forest restored through silvicultural practices, the area of land restored with agroforestry systems, and the area of land restored with improved fallows

Cross-reference
ITTO (2002)

Criterion 4: Forest production

This criterion addresses the objective of maintaining the multiple functions of forests and their capacity to deliver products and environmental services. Such functions and capacity can only be sustained in the long term if forest management is economically and financially viable, environmentally sound and socially acceptable.

Forests earmarked for timber production are able to fulfil a number of other important functions, such as environmental protection, carbon storage and the conservation of species and ecosystems. These multiple roles should be safeguarded by the application of sound management practices that maintain the potential of the forest resource to yield the full range of benefits to society.

A log landing in Ravenscott, Sarawak, Malaysia. Production forests can also perform many other important functions. Photo: J. Blaser

Resources assessment: indicators 4.1–4.4

Forest resource assessments carried out periodically are vital for ensuring the sustainable production of forest goods and environmental services for society. They provide information not only on the quantities of wood and non-wood products that may be harvested sustainably but also on other forest values and how those might change over time.

Indicator 4.1 **Natural production forest inventories, by product**	National level	FMU level	Landscape level
	×	✓✓	×

Proposed monitoring and reporting format				
Area inventoried *[please give reference year]*	*PFE*		*Non-PFE (ha)*	
	ha	*%*	*ha*	*%*
Timber (industrial roundwood)				
Other wood (locally used, woodfuel)				
Non-wood forest products				
Total inventoried area				

Continued next page

Indicator 4.1 (*continued from previous page*)

Notes

- Indicate the extent and percentage of forest for which inventory and survey procedures have been used to determine the quantity of the main forest products (e.g. wood, fibre, gums, saps, food animals and plants, and medicines)

Cross-references

Blaser et al. (2011) and other editions of ITTO's *Status of Tropical Forest Management* reports; FAO (2015); FAO Forest Monitoring and Assessment programme

Indicator 4.2 **Actual and allowable harvest of wood and non-wood products in natural forests**	National level	FMU level	Landscape level
	✓✓	✓✓	✖

Proposed monitoring and reporting format

	Total forest area (i.e. PFE + non-PFE)			*PFE*		*Non-PFE*	
	Number of species harvested	*Top five species harvested, by volume*		*Annual actual harvest*	*Annual allowable harvest*	*Annual real harvest*	*Annual allowable harvest*
Timber (industrial roundwood)		1		m^3	m^3	m^3	m^3
		2		m^3	m^3	m^3	m^3
		3		m^3	m^3	m^3	m^3
		4		m^3	m^3	m^3	m^3
		5		m^3	m^3	m^3	m^3
Other wood (e.g. locally used; woodfuel)		1		m^3	m^3	m^3	m^3
		2		m^3	m^3	m^3	m^3
		3		m^3	m^3	m^3	m^3
		4		m^3	m^3	m^3	m^3
		5		m^3	m^3	m^3	m^3
Non-wood forest products *[please specify]*		1		kg	kg	kg	kg
		2		kg	kg	kg	kg
		3		kg	kg	kg	kg
		4		kg	kg	kg	kg
		5		*kg*	*kg*	*kg*	*kg*

Notes

- Indicate average harvesting levels for the most recent 3-year period for which data are available (give the source of the data and the unit of measurement)
- Describe the method for estimating the annual allowable cut for industrial roundwood

Cross-references

Blaser et al. (2011) and other editions of ITTO's *Status of Tropical Forest Management* reports

Indicator 4.3 **Actual harvest of wood and non-wood products in planted forests**	National level	FMU level	Landscape level
	✓✓	✓✓	×

Proposed monitoring and reporting format

	Total annual planted-forest harvest	*List the top five species harvested (by volume or weight) for each category, and actual annual harvest*		
Timber (industrial roundwood)	m^3	1		m^3
		2		m^3
		3		m^3
		4		m^3
		5		m^3
Other wood (e.g. locally used; woodfuel)	m^3	1		m^3
		2		m^3
		3		m^3
		4		m^3
		5		m^3
Non-wood forest products	kg	1		kg
		2		kg
		3		kg
		4		kg
		5		kg

Notes

- Indicate the reported average harvest levels over the latest 3-year period, together with the source of the data

Cross-references

FAO (2015); Blaser et al. (2011) and other editions of ITTO's *Status of Tropical Forest Management* reports; Jürgensen et al. (2014); FAO's webpage on non-wood forest products: www.fao.org/forestry/nwfp/en

Indicator 4.4 **Forest carbon stock**	National level	FMU level	Landscape level
	✓✓	×	×

Proposed monitoring and reporting format			
	Forest area (ha)	*Tonnes of carbon committed*	*Timeframe (years)*
Forest carbon stocks conserved through the sustainable management of natural forests and forest conservation			
Restoring degraded carbon stocks through the enrichment of degraded forests and guided natural restoration			
Creating new carbon stocks through afforestation and reforestation in non-forested areas			

Notes
- Include all forest-related climate-change mitigation programmes, such as REDD+, forest NAMAs, INDCs, Clean Development Mechanism Afforestation/Reforestation
- Where possible, distinguish on the basis of the currently applied REDD+ strategy

Cross-references
Forest Carbon Partnership Facility Carbon Fund; UN-REDD Programme (www.un-redd.org); UNFCCC's REDD+ web platform (http://redd.unfccc.int); Clean Development Mechanism Afforestation/Reforestation (https://cdm.unfccc.int)

Harvesting planning and control procedures: indicators 4.5–4.7

Harvesting planning procedures in natural forests should enable good technical control, provide safe and healthy working conditions, minimize costs, and reduce environmental impacts. Sound and effective harvest planning procedures will help ensure that forest investments yield adequate financial, economic and social returns while minimizing environmental damage.

Indicator 4.5 **Timber harvesting arrangements in natural production forests**	National level	FMU level	Landscape level
	×	✓✓	×

Proposed monitoring and reporting format

Natural forest harvesting contracts *[please indicate reference year]*	*Total number of contracts*	*Total area contracted (ha)*	*Smallest/ largest area contracted (ha)*	*Duration of contract (years)*	*Annual allowable harvest and area of harvest (m^3; ha)*	*Annual actual harvest (volume and area) (m^3; ha)*
Long-term private concession						
Long-term community concession						
Medium-term logging concession/ contract						
Short-term logging permit (area-based)						
Short-term logging permit (volume-based)						
Other *[please specify]*						

Notes
- Specify the main terms of the various natural forest harvesting contracts currently in place
- Indicate the share of harvesting contracts operating under multiyear forest management plans
- Indicate the share of other official harvesting permits (small-, medium- and large-scale permits) operating without forest management plans

Cross-reference
FAO (2001a)

Indicator 4.6 **Forest product tracking systems or similar control mechanisms**	National level	FMU level	Landscape level
	✓✓	×	✓✓

Proposed monitoring and reporting format			
Type of tracking	*System in place [Yes/No]*	*Responsible institution(s)*	*Comment (e.g. scale of application, efficiency)*
Log tracking (from stump to processing unit)			
Wood tracking (from processing unit to port/end-user)			
Tracking of other forest products (e.g. wild meat, wildlife, charcoal, other non-wood forest products) *[please specify]*			

Notes
- In comments, describe the type(s) of system, and implementation (e.g. responsible parties, scope and scale)

Cross-reference
Seidel (2012)

Indicator 4.7 **Historical records on the extent, nature and management of forests**	National level	FMU level	Landscape level
	✓✓	✓✓	✓

Proposed monitoring and reporting format		
	Natural forests	*Planted forests*
Describe the availability of historical records on the extent, nature and management of forests (nationally, subnationally or locally)		
Do archives of forest data (e.g. growth, yield, health and uses) exist, and are they accessible for forest planning and management?		
Have permanent sample plots been established? If yes, specify when they were established and the year of most recent re-measurement		

Notes
- In many countries, records exist of historical forest trials and measurements of the growth of tree species, as well as of harvesting and silvicultural practices in natural and planted forests. Such records have often been neglected, but they could be valuable sources of information on the long-term behaviour and growth of tree species and forest stands

Cross-references
Archives of forest concessionaires; national forest research institutes

Silviculture in natural and planted forests: indicators 4.8–4.10

The provision of clear silvicultural guidelines helps ensure that all forest operations are carried out according to high standards. In natural forests, these may encompass harvesting inventories as a means of establishing sustainable cutting levels (for wood and non-wood forest products), inventories for assessing the condition of forests after harvesting, and the types of silvicultural treatments required to ensure adequate regeneration and long-term forest health. Guidance is also needed to reduce forest damage caused by harvesting and on silviculture in planted forests, forest restoration, and procedures for the monitoring and evaluation of management practices.

Indicator 4.8 **Reduced impact harvesting and silvicultural operations**	National level	FMU level	Landscape level
	×	✓✓	✓

Proposed monitoring and reporting format		
	Natural forests	*Planted forests*
Describe existing recommended harvesting systems and guidelines and the extent to which they are being implemented		
Describe existing recommended silvicultural systems and guidelines for wood and non-wood forest products, and the extent to which they are being implemented		
Indicate the extent to which reduced impact harvesting and silvicultural treatments are being monitored, including by whom and at what geographical scale		
Indicate the extent to which monitoring data are being archived to allow the evaluation of the cumulative effects of harvesting systems and silvicultural treatments over time		
Describe post-harvesting surveys to assess the effectiveness of harvesting and silvicultural activities to enhance forest stands and tree regeneration establishment and the monitoring of silvicultural treatments		

Notes

- A silvicultural system is a process by which forest trees are tended, removed and replaced by new trees. Silviculture comprises all operations used in manipulating forest stands, including harvesting operations (see Annex 2 for a definition of reduced impact harvesting)

Cross-references

ITTO (2015), principles 4 and 5; FAO (1996); Tropical Forest Foundation (2007); ITTO (1993); FAO (2006b)

Indicator 4.9 **Silvicultural management in planted forests**	National level	FMU level	Landscape level
	×	✓✓	×
Proposed monitoring and reporting format			
Silvicultural issue in planted forests	*Indicate the approaches taken*		
Species selection for planted forests (e.g. whether local species, introduced species, including consideration of invasive species, source of planting materials)			
Use of biotechnology and genetic modification of species			
Selection of the silvicultural treatment and maintenance of planting sites beyond first rotation			
Control of pests and diseases (e.g. use of herbicides, pesticides, fungicides and other chemicals)			
Use of fertilizers (nursery, afforestation sites)			
Fire control			
Water management in planted forest landscapes			
Notes • Defining the specific silvicultural and operational treatments for planted forest management is important, whether it is for productive or protective functions, or a combination of these			
Cross-references ITTO (1993); FAO (2006a); FAO (2006b); Evans (2009)			

Indicator 4.10 **Strategic monitoring of silvicultural systems in natural and planted forests**	National level	FMU level	Landscape level
	✓✓	✓✓	✓
Proposed monitoring and reporting format			
Describe the system in place for strategically monitoring the impacts of harvesting and the implementation of the silvicultural system			
Silvicultural system at FMU level	*Total area per year (ha)*		
Natural production forest (PFE) (natural forest timber concessions, licences, community harvesting, non-wood forest product harvesting)			
- Area over which yield control is applied			
- Area over which pre-harvesting operations are applied			
- Area over which post-harvesting operations are applied			
- Area over which silvicultural treatments to induce or assist natural regeneration are applied			
- Area over which enrichment planting *[please specify main species]* is performed			

Continued next page

Indicator 4.10 (*continued from previous page*)

Proposed monitoring and reporting format	
Describe the system in place for strategically monitoring the impacts of harvesting and the implementation of the silvicultural system	
Planted forest (PFE) (Industrial plantations timber/fibre/ woodfuel; community plantations; protective planting)	*Total area per year (ha)*
- Tending and thinning in monospecific plantations *[please specify main species used]*	
- Tending and thinning in multispecies plantations *[please specify mix of species used]*	
- Replacement of forest stand after harvesting *[please indicate the % of replacement]*	

Notes

- Strategic monitoring provides data on the long-term effects of forest operations so that potential problems can be identified and resolved. To guide silvicultural decisions, a simple assessment method (diagnostic sampling) can be applied at the FMU level to determine the need for specific treatment
- Indicate reference year
- Common treatments to induce or assist natural regeneration include tending natural regeneration, soil scarification, prescribed burning, the liberation of future crop trees, thinning, liana cutting and enrichment planting

Cross-references

ITTO (2015); FAO (1996); Tropical Forest Foundation (2007); ITTO (1993)

Criterion 5: Forest biological diversity

This criterion relates to the conservation and maintenance of biodiversity, including ecosystem, species and genetic diversity, with an emphasis on biodiversity conservation in production forests and at the landscape scale. The ITTO/IUCN Guidelines for the Conservation and Sustainable Use of Biodiversity in Tropical Timber Production Forests *(ITTO/IUCN 2009) are designed to support the monitoring of biodiversity in forest landscapes. The general principles and definitions used here are those established by the Convention on Biological Diversity and IUCN.*

Ecosystem diversity: indicators 5.1 and 5.2

The conservation of ecosystem diversity can best be accomplished by maintaining functional landscapes and through the establishment and management of a system of protected areas (combinations of IUCN categories I–VI)[5] containing representative samples of all forest types linked as far as possible by biological "corridors" or "stepping stones". This can be ensured by effective land-use policies and systems for choosing, establishing and maintaining the integrity of protected areas in consultation with and through the involvement of local communities.

A heron takes flight in a flood forest in Veracruz, Mexico, an area rich in biodiversity. Photo: Gerardo S. Sánchez Vigil

Indicator 5.1 **Forest extent in protected areas**	National level	FMU level	Landscape level
	✓✓	✓	×

Proposed monitoring and reporting format				
a. Forest protected areas	***IUCN protected-area category***			
	Total	*I–II*	*III–IV*	*V, VI*
Number of protected areas (not necessarily forested; excluding sea)				
Range in size (smallest to largest protected area; ha)				

Continued next page

5 See Annex 3.

Indicator 5.1 (*continued from previous page*)

Proposed monitoring and reporting format

a. Forest protected areas	***IUCN protected-area category***			
	Total	*I–II*	*III–IV*	*V, VI*
Area of forest in protected areas (ha)				
Area of ecological forest types represented in protected areas *[please specify]*				
Ecological forest types considered to be underrepresented in protected areas *[please specify]*	*[textual response]*			
b. Forest conservation concessions				
If not included in (a), indicate the number and area of forest conservation concessions, and their status and duration				

Notes

- The area of forest in protected areas constitutes the protection PFE
- Forest conservation concessions are areas within production forest allocated to conservation organizations for conservation purposes (and in which wood production is excluded). Although formally production forests, such areas should be reported here as protected areas, albeit only for the period of the leases

Cross-references

ITTO/IUCN (2009); IUCN protected-area categories (see Annex 3)

Indicator 5.2 **Buffer zone management and connectivity of protected forest areas**	National Level	FMU level	Landscape level
	✓✓	✓	×

Proposed monitoring and reporting format

IUCN category	*Areas of buffer zone managed (ha)*	*Number of forested protected areas connected*	*Description*
I–II			
III–IV			
V–VI			
Describe the national or subnational strategy for ensuring (or increasing) connectivity between forested protected areas			

Cross-references

ITTO/IUCN (2009); IUCN protected-area categories (see Annex 3)

Species diversity: indicators 5.3 and 5.4

In strategies for preventing species from becoming rare, threatened, endangered or extinct, it is important to have national/subnational procedures for monitoring and protecting species diversity. Emphasis should be given to the monitoring of key tree species in production forests.

Indicator 5.3 **Threatened forest-dependent species**	National Level	FMU level	Landscape level
	✓✓	✓	×

Proposed monitoring and reporting format					
Forest-dependent species group	*Total number of species*	*Of which:*			*List the three most important species (keystone species)*
		Threatened	*Legally protected at national level*	*Endemic*	
Trees					
Flowering plants					
Ferns					
Mammals					
Birds					
Reptiles					
Amphibians					
Freshwater fish					
Butterflies					
Others *[please specify]*					

Notes
- Indicate sources
- "Threatened" includes vulnerable, endangered or critically endangered according to the IUCN Red List

Cross-references
IUCN categories of threatened species (see Annex 4 of this document)

Indicator 5.4 **Procedures for conserving tree species diversity in natural tropical forests**	National Level	FMU level	Landscape level
	×	✓✓	×

Proposed monitoring and reporting format	
Comment on whether there have been declines in populations of key tree species (e.g. high-value commercial species)	
List the major commercial tree species (wood and non-wood forest products) for which conservation status has changed in the last five years	

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Indicator 5.4 (*continued from previous page*)	
Proposed monitoring and reporting format	
Describe measures (in FMU) for analyzing the conservation status of tree species and interventions (e.g. age and diameter class distribution of key species)	
List the tree species in each of the CITES Appendices	
Describe the measures undertaken to maintain species diversity at the FMU level, in particular the most commonly used wood and non-wood product species	
Describe procedures undertaken to maintain the stock of major wood and multipurpose tree species in natural forests	
Indicate the type and area (ha) of *in situ* conservation of forest tree species nationally	
Notes • Describe procedures to identify, list and protect recover/restore threatened species of forest flora and fauna • List the institutions responsible and describe any recent changes in the procedures	
Cross-references FAO (2014c); ITTO (2005); IUCN Red List (www.iucnredlist.org)	

Genetic diversity: indicator 5.5

Biodiversity conservation involves maintaining the genetic diversity of all species of fauna and flora. This may be difficult to ensure in practice, and it is appropriate to focus limited resources on species that are threatened or that have identified commercial value.

Indicator 5.5 ***In situ* conservation of genetic variation within specified forest tree species**	National level	FMU level	Landscape level
	✓✓	✓	×
Proposed monitoring and reporting format			
	Comment		
Forest tree species identified to serve as indicator species for the conservation of genetic variation			
Plans and projects in place to ensure the *in situ* and *ex situ* conservation of the genetic variation of key species of flora and fauna *[please specify the species]*			
Notes • Conserving genetic diversity within tree species of actual or potential economic, environmental, scientific or societal value is essential for ensuring continued ecosystem productivity and health and the capacity of species to adapt to climate change and other environmental change			
Cross-references FAO (2014c); FAO et al. (2004)			

Biodiversity conservation in production forests: indicators 5.6 and 5.7

Management measures in production forests can make important contributions to biodiversity conservation (for example, logging intensity is directly related to the presence or absence of birds and other seed distributors), which should be fully integrated into forest management plans and harvesting plans.

Indicator 5.6 **Biodiversity conservation measures in natural production forests**	National level	FMU level	Landscape level
	×	✓✓	×
Proposed monitoring and reporting format			
	Total area (ha)		*% of total*
Area set aside for biodiversity conservation in natural production forests (FMU level)			
Measures for retaining undisturbed areas (FMU level)	*[Textual response]*		
Procedures for protecting ecologically important features (e.g. nesting sites, seed trees, niches and keystone species)	*[Textual response]*		
Procedures for protecting particular tree species and other plants for local livelihood needs, cultural values, food security, etc.	*[Textual response]*		
Average volume of wood harvested (FMU level)	*[m^3 per ha per year]*		
Notes • In textual responses, indicate the effectiveness of the procedures being monitored • In textual responses, indicate procedures for assessing changes in biodiversity values in production areas compared with control areas			
Cross-references ITTO/IUCN (2009); Burivalova et al. (2014)			

Indicator 5.7 **Biodiversity conservation in planted forests**	National level	FMU level	Landscape level
	×	✓✓	×
Proposed monitoring and reporting format			
	Average annual area (ha)	*Year span*	*Main species used*
Area of planted forest established (3-year average *[please specify])*			
Afforestation: planted forest on non-forested land (not replacing natural forest habitats)			
Reforestation: planted forest on previously forested sites (e.g. degraded forest and forest land)			
Planted forests established using native tree species			
Describe measures undertaken to conserve native fauna and flora in planted forest landscapes*	*[Textual response]*		
Notes * e.g. keeping natural sites along waterways, creating biological corridors or stepping stones			
Cross-references ITTO (1993); FAO (2006b)			

Criterion 6: Soil and water protection

This criterion addresses the crucial landscape-scale role of forests in maintaining downstream water quality and flow and controlling flooding and sedimentation. It also pertains to maintaining the productivity and quality of soil and water within forests (and associated aquatic ecosystems) and therefore forest health and condition.

Information on the effects of forest management on soil and water is difficult to obtain and is seldom available for more than a limited number of sites. Valid national indicators should be derived from the aggregation of data from indicators at the landscape and FMU levels, or from the existence and adequate enforcement of national guidelines in conformity with local conditions.

Two people navigate a river on the border between Cameroon and Gabon, where a long-term ITTO project helped in the establishment and management of the Mengamé Wildlife Sanctuary. Forests play crucial landscape-scale roles in maintaining downstream water quality and flow and controlling flooding and sedimentation. Photo: M.J. Dourojeanni/ITTO

Extent of protection: indicators 6.1 and 6.2

An essential element of multipurpose forest management is the landscape-scale maintenance of downstream benefits, such as water quality and flow and reductions in flooding and sedimentation.

Indicator 6.1 **Forest area managed primarily for the protection of soil and water**	National level	FMU level	Landscape level
	✓✓	✓	✓✓
Proposed monitoring and reporting format			
	Area (ha)		*%*
Forest area (natural and planted, PFE and non-PFE) managed primarily for the protection of soil and water			
Forest area (natural and planted, PFE and non-PFE) managed for other protection purposes *[please specify purposes]*			

Continued next page

Indicator 6.1 (*continued from previous page*)
Notes • Collect national or subnational data • Other protection purposes might include cultural heritage sites, belts around industrial complexes, military sites, etc. • For each specific purpose, indicate the responsible agencies (e.g. forest agency, environmental agency, water agency, mining agency)
Cross-references • FAO (2015); UNEP and UNISDR (undated)

Indicator 6.2 **Protection of downstream catchment values at the landscape level**	National level	FMU level	Landscape level
	✓✓	✓	✓✓
Proposed monitoring and reporting format			
Describe the procedures in place in both the PFE and the non-PFE to ensure the protection of downstream catchment values, and the extent to which such procedures are being implemented			
Describe the extent to which forests are integrated into national and regional disaster risk management			
Notes • Trees and forests play fundamental roles in disaster risk management, such as by sustaining water supplies, protecting soils and reducing the impacts of natural hazards such as floods and landslides			
Cross-references UNEP and UNISDR (undated); FAO (1990); FAO (2005a)			

Protective functions in production forests: indicators 6.3–6.5

As an integrative part of multipurpose forest management, it is important to ensure effective soil and water management as a way of maintaining the productivity and health of forests and their hydrological regulation functions.

Indicator 6.3 **Soil productivity and water retention capacity in production forests**	National level	FMU level	Landscape level
	×	✓✓	✓✓
Proposed monitoring and reporting format			
Describe the procedures in place to protect soil productivity and retain water in production forests			
Describe the extent to which provisions are being applied to prevent the degradation of forest soils and water			
Cross-references FAO (1990); FAO (2005a)			

Indicator 6.4 **Area of production PFE considered environmentally sensitive and protected**	National level	FMU level	Landscape level
	×	✓✓	×

Proposed monitoring and reporting format			
Area defined as environmentally sensitive (and therefore protected) due to:	*Area (ha)*	*% of production PFE*	*Comment*
Slope/elevation *[please specify parameters—e.g. >X%]*			
Drinking water sources			
Buffer strips (e.g. along water courses)			
Poor drainage			
Other characteristics *[please specify]*			
Cross-references FAO (1990); FAO (2005a)			

Indicator 6.5 **Forest engineering for soil and water protection**	National level	FMU level	Landscape level
	×	✓✓	×

Proposed monitoring and reporting format	
In production PFE:	
a) Indicate required measures to ensure adequate water management (drainage) during and after wood harvesting	
b) Indicate requirements for buffer strips along streams and rivers	
c) Indicate the measures required to minimize soil compaction by harvesting machinery	
d) Indicate the measures required to protect soil from erosion after harvesting operations	
Indicate the measures in place to ensure the implementation of a–d	
Notes • Are the measures being implemented? Is their effectiveness being monitored? At what geographical scale?	
Cross-reference Bonell and Bruijnzeel (2005)	

Criterion 7: Economic, social and cultural aspects

This criterion deals with the economic, social and cultural aspects of forests. A well-managed forest is a self-renewing resource that produces a host of benefits for people. For example, forests provide opportunities for recreation and ecotourism and generate employment and investment in processing industries. Sustainably managed forests, therefore, can make important contributions to the overall sustainable development of countries.

Economic aspects: indicators 7.1–7.3

The economic challenge for forest management is to make SFM a profitable activity that is attractive to investors and competitive with other land uses. A viable forest products industry is likely to be an essential element in addressing this challenge.

A woman works in a tree nursery in Benin. Ensuring the health and safety of workers is an important aspect of SFM. Photo: J. Blaser

Indicator 7.1 **Contribution of the forest sector to gross domestic product**	National level	FMU level	Landscape level
	✓✓	✓	✓

Proposed monitoring and reporting format		
	Total gross domestic product (GDP; US$)	*% of forest-sector contribution to GDP*
Reference year *[please specify here]*		
Reference year minus five years *[please specify here]*		
Indicate which economic activities are counted under "forest sector"	*[Textual response]*	
Indicate the extent to which the informal forest sector contributes to GDP	*[Textual response]*	
Describe the national/subnational environmental accounting system in place (if any)	*[Textual response]*	
Cross-reference World Bank (2016)		

Indicator 7.2 **Value of domestically produced forest products and environmental services**	National level	FMU level	Landscape level
	✓✓	×	×

Proposed monitoring and reporting format

	Markets (US$ or local currency; if the latter, please indicate the exchange rate for US dollars)		
	Domestic market (rural/urban)	*Export market*	*Informal domestic/ transboundary*
Timber products			
Woodfuel			
Non-wood forest products			
Water			
Carbon (US$ or local currency—please specify—per tonne CO_2)			
Ecotourism/recreation (entry fees, etc.)			
Other *[please specify]*			

Notes
- Indicate reference year for data
- Values for timber products should be the sums of primary and secondary products (including wood furniture); indicate which products are included

Cross-references
ITTO Market Information Service (www.itto.int/market_information_service); Ecosystems Marketplace (www.ecosystemmarketplace.com)

Indicator 7.3 **Wood and non-wood forest product processing capacities and efficiency**	National level	FMU level	Landscape level
	✓✓	✓✓	✓

Proposed monitoring and reporting format

Forest product processing stage	*No. of companies*	*Industrial roundwood intake (m^3)*	*Conversion rate (%)*	*No. of full-time equivalent employees (formal)*
Roundwood (forest to mill)	*n/a*			*n/a*
Primary wood processing				
Secondary wood processing				
Tertiary wood processing		*n/a*	*n/a*	
Industrial non-wood forest product processing *[please specify products]*		*n/a*	*n/a*	
Continuity of supply of wood and non-wood products	*[Textual response]*			

Continued next page

Indicator 7.3 (*continued from previous page*)
Notes • "Industrial roundwood intake" includes roundwood from domestic production and imported roundwood processed in the country—it is the total volume of roundwood processed in mills (not the volume of harvested wood) • Conversion rate is the ratio of output volume to input volume, expressed as a percentage
Cross-references • ITTO Market Information Service (www.itto.int/market_information_service); national statistics

Social and cultural aspects: indicators 7.4–7.9

SFM should recognize and aim to meet social and cultural needs as they relate to forests, including by ensuring the provision of education, employment and safe working conditions. Forest management decisions should consider the livelihood needs of forest-dependent people. SFM should be participatory and inclusive, and the costs and benefits should be shared equitably among involved parties.

Indicator 7.4 **Capacity building of the workforce in forest management and forest industry**	National level	FMU level	Landscape level
	✓✓	✓✓	✓
Proposed monitoring and reporting format			
The number and main focus of universities, technical institutions, vocational training and other professional schools with formal programmes on SFM			
Existing capacity for training and support using appropriate technology, including through technology transfer, for SFM and the efficient use and marketing of wood and non-wood forest products and environmental services *[please describe and quantify]*			
Number of people graduated (tertiary, technical and vocational) from forest-related courses in the last three years *[please specify years]*			
Percentage of graduates (tertiary, technical and vocational) of forest-related courses in the previous three years obtaining employment in the forest sector *[please specify years]*			
Number of graduates from professional training programmes for forest managers, previous three years *[please specify years]*			
Other training courses not included above (e.g. capacity development programmes for small and medium-sized forest enterprises)			
Cross-references Convention No. 169 of the International Labour Organization (www.ilo.org); ITTO (2015), Principle 6			

Indicator 7.5 **Procedures to ensure the health and safety of forest workers**	National level	FMU level	Landscape level
	✓	✓✓	×

Proposed monitoring and reporting format		
Existence and implementation of policies addressing:	*National level (Yes/No)*	*FMU level (Yes/No)*
• Elimination or control of risks in forest management operations		
• Provision of safe work methods and procedures		
• Procedures for ensuring maximum safety of machinery and handling of chemicals, etc.		
• Use of safety gear and provision of workforce training on workplace health and safety		
• Proper compensation for employees in case of accidents, injuries and damage during the performance of duties		
What mechanisms are in place nationally/subnationally to ensure the health and safety of forest workers?	*[Textual response]*	
To what extent are such mechanisms being implemented? Please identify any constraints	*[Textual response]*	
Are such mechanisms in conformity with the International Labour Organization's Convention No. 169?	*[Yes/No]*	
The number of serious accidents in forest management operations over the past three years, by cause:	No. of deaths	No. of serious injuries
Cause 1 *[please specify here]*		
Cause 2 *[please specify here]*		
Cause 3 [please specify here]		
Cause 4 [please specify here]		

Cross-references
Convention No. 169 of the International Labour Organization; ITTO (2015), Principle 6; FAO Harvesting (www.fao.org/forestry/harvesting/86024/en)

Indicator 7.6 **Mechanisms for the equitable sharing of the costs and benefits of forest management**	National level	FMU level	Landscape level
	×	✓✓	×

Proposed monitoring and reporting format		
Policies in place for:	*Yes/No*	*Comment*
• The equitable treatment of stakeholders in activities related to the use and management of forests		
• Providing opportunities to be employed under comparable conditions to those in other economic sectors		
• The sharing of profits obtained by forest companies and investors through forest use with local communities and other stakeholders		
• Providing forest landowners or rights-holders (e.g. government, private, community) with opportunities to receive fair returns for forest use		
Mechanisms in place for the distribution of incentives and the fair and equitable sharing of costs and benefits among stakeholders *[please comment on whether such mechanisms are being implemented, the obstacles to their implementation, and any proposed improvements]*	*[Textual response]*	

Cross-references
Convention No. 169 of the International Labour Organization; ITTO (2015), Principle 6

Indicator 7.7 **Mechanisms for resolving disputes between forest stakeholders**	National level	FMU level	Landscape level
	×	✓✓	✓✓

Proposed monitoring and reporting format		
Matters that may be taken into account:	*Yes/No*	*Comment*
• The existence of effective mechanisms for communication and the resolution of conflicts between interested parties		
• The extent to which stakeholders have an effective voice in decisions related to forest management, including consideration of gender equity		
• Early consultation on major new decisions to invest in forest management, in both natural and planted forests		
• Mechanisms for conflict resolution, the extent to which they are being implemented, and any obstacles to implementation	*[Textual response]*	

Cross-references
FAO resources for conflict management in forestry (www.fao.org/forestry/conflict/56824/en); FAO (2014b); United Nations Declaration on the Rights of Indigenous Peoples (www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf)

Indicator 7.8 **Local livelihoods and forest management**	National level	FMU level	Landscape level
	×	✓✓	✓✓

Proposed monitoring and reporting format			
Forest-dependent people (FMU level)	*No. female*	*No. male*	*Total*
Number of people in the FMU practising mainly subsistence farming			
Proportion of forest-dependent people who have lived in the FMU for more than one generation (%)			
Forest area for subsistence and traditional use:	*Forest area (ha)*		*Comment*
• In informal areas within existing FMUs *[please specify land uses and measures for managing overlapping land uses]*			
• On land reserved for livelihood activities—e.g. indigenous peoples' reserves, community forests, other reserved areas *[please specify whether in or adjacent to FMU]*			
Cross-references ITTO (2015), Principle 6; FAO (2015)			

Indicator 7.9 **Forests reserved for specific cultural, research and educational purposes**	National level	FMU level	Landscape level
	✓✓	×	×

Proposed monitoring and reporting format			
Extent of forest area assigned to specific uses	*No. of forests*	*Area (ha)*	*Protection status*
Archaeological sites in the forests			
Cultural sites in forests			
Sacred forests (as defined in the country)			
Forests for research and educational purposes			
Forests for recreation, local tourism and peri-urban uses			
Other *[please specify]*			
Cross-reference ITTO (2015), Principle 6			

Community and indigenous peoples' rights and participation in forest management: indicators 7.10–7.12

Community participation is vital at all levels of forest operations to ensure transparency and accountability in forest management, conservation and development and that all interests and concerns are taken into account. Forest agencies, forest owners and concessionaires must be willing and able to adapt their behaviour in light of such participation.

Indicator 7.10 **Tenure and user rights of indigenous peoples and local communities over publicly owned forests**	National level	FMU level	Landscape level
	✓✓	✓✓	✓✓
Proposed monitoring and reporting format			
	Area (ha)	*Comment*	
Area of publicly owned forest for which the tenure and user rights of indigenous peoples and other communities are recognized and practised			
Estimated area of PFE or FMU with recognized tenure and use rights for indigenous peoples and other local communities			
Processes for resolving disputes over the forest-related rights of indigenous peoples and other local communities	*[Textual response]*		
Notes • Describe any constraints and proposals for improvements			
Cross-references ITTO (2015), Principle 6; FAO (2015); Rights and Resources tenure database (www.rightsandresource.org)			

Indicator 7.11 **Involvement of indigenous peoples and local communities in forest management**	National level	FMU level	Landscape level
	×	✓✓	✓✓
Proposed monitoring and reporting format			
Indicate the extent of involvement of indigenous peoples, local communities and other forest dwellers in forest management capacity building, consultation processes, decision-making and implementation			
Describe the legislative and other efforts in place for achieving gender equity in forest management planning and implementation, in particular to enable the participation of indigenous and other local women			
Cross-references ITTO (2015), Principle 6; United Nations Declaration on the Rights of Indigenous Peoples (www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf); SFM Toolbox module on gender in forestry (www.fao.org/sustainable-forest-management/toolbox/modules/gender-in-forestry/basic-knowledge/en)			

Indicator 7.12 **Recognition and value of the forest-management knowledge and skills of local people**	National level	FMU level	Landscape level
	✓	✓✓	×
Proposed monitoring and reporting format			
Indicate the extent to which indigenous and traditional forest-related knowledge and practices are integrated in forest management planning and implementation, and the constraints to greater integration			
Cross-references ITTO (2015), Principle 6			

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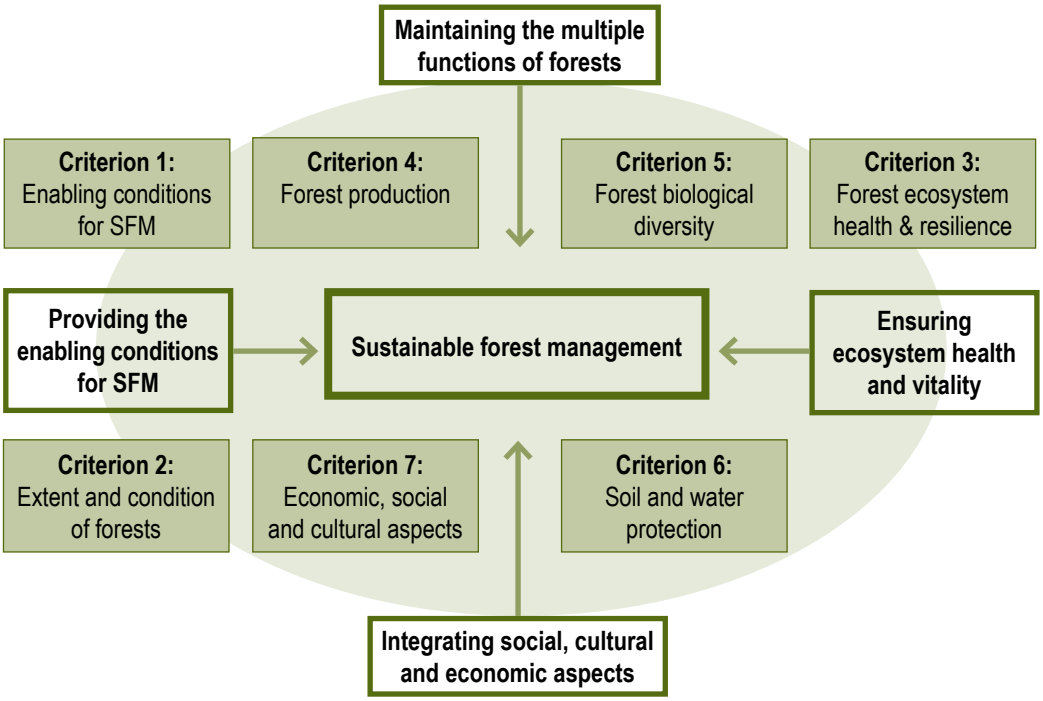
Annex 1: Schematic representation of the ITTO criteria and indicators for sustainable forest management



ITTO defines sustainable forest management as: "the process of managing forests to achieve one or more clearly specified objectives of management with regard to the production of a continuous flow of desired forest products and services without undue reduction of its inherent values and future productivity and without undue undesirable effects on the physical and social environment".

Annex 2: Definitions

Adaptive management (also "adaptive resource management")	A structured, iterative process of optimal decision-making in the face of uncertainty, with the aim of reducing uncertainty over time via systematic monitoring. In forestry, adaptive management is a process by which forest managers adjust their strategies for meeting forest management objectives as conditions change
Afforestation	The establishment of a planted forest on non-forested land
Agroforestry	A collective term for land-use systems and technologies in which woody perennials (trees, shrubs, palms, bamboos, etc.) are deliberately used on the same land-management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence. In agroforestry systems there are both ecological and economical interactions between the different components (Lundgren and Raintree 1982 cited by Nair 1993)
Allowable cut	The volume of commercial wood that may be harvested in a given area (e.g. a forest management unit) in a specified period
Best practices	The methods, processes, incentives, systems and policies that have been demonstrated to achieve superior results in an area of work
Biodiversity (also "biological diversity")	The variability among living organisms from all sources, including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part: this includes diversity within species, between species, and of ecosystems (Convention on Biological Diversity, Article 2)
Biomass stock	Organic material, both aboveground and belowground and both living and dead (e.g. trees, crops, grasses, tree litter and roots)
Canopy	In a simplified model of a tropical rainforest, four canopy layers can be distinguished: A-layer, containing emergent canopy species; B-layer, containing intermediate canopy species; C-layer, containing subcanopy species; and D-layer, comprising tree regeneration
Carbon pools	Defined places in forest ecosystems where carbon is stored. The Intergovernmental Panel on Climate Change distinguishes five carbon pools in the category of land-use, land-use change and forestry: 1) living biomass above and 2) below ground, 3) dead biomass above ground, 4) litter and 5) organic soils
Carbon stock/forest carbon stock	The amount of carbon held in the biomass of a given area of forest
Criterion	A category of conditions or processes by which sustainable forest management may be assessed
Deforestation	The conversion of forest to another land use

Degraded forest	Forest that delivers a reduced supply of goods and environmental services from a given site and maintains only limited biodiversity. Degraded forest has lost the structure, function, species composition and/or productivity normally associated with the natural forest type expected at that site
Degraded forest land	Former forest land severely damaged by the excessive harvesting of wood or non-wood forest products, poor management, repeated fire, grazing or other disturbances or land uses that damage soil and vegetation to a degree that inhibits or severely delays the re-establishment of forest after abandonment
Elastic capacity (of forest ecosystems)	A measure of the capacity of a forest ecosystem to return to its equilibrium state after disturbance [closely related to resilience]
Endemic species	A species native to, and restricted to, a particular geographical region
Enrichment (planting)	The planting of desired tree species in natural forest with the objective of creating a forest dominated by desirable tree species
Environmental services	The benefits people obtain from forest ecosystems. They include provisioning services, such as food and water; regulating services, such as the regulation of floods, droughts, land degradation and disease; supporting services, such as soil formation and nutrient cycling; and cultural services, such as recreational, spiritual, religious and other nonmaterial benefits. Forest environmental services perform a range of functions, such as: moderating weather extremes and their impacts; dispersing seeds; mitigating drought and floods; cycling and moving nutrients; protecting stream and river channels and coastal shores from erosion; detoxifying and decomposing wastes; controlling agricultural pests; maintaining biodiversity; generating and preserving soils and renewing their fertility; contributing to climate stability; purifying air and water; and pollinating crops and natural vegetation. Tropical forests provide all these services and are often particularly important for carbon sequestration, biodiversity conservation, the protection of water catchments and the regulation of regional climates
Food security	Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and for an active and healthy life (World Summit on Food Security, Rome, November 2009)
Forest	Defined at the national level. In general terms, a forest is land containing trees with a minimum specified percentage tree canopy cover, with trees capable of reaching a minimum specified height *in situ* when mature. Various international bodies have provided generic definitions of forests (see Annex 7 of ITTO 2002)

Forest concession	A tract of forest land under a (usually multiyear) licence agreement, lease or permit with individuals, communities or corporations for the sustainable production of wood and other forest products, usually with obligations for the protection and conservation of the goods and environmental services provided by the forest
Forest degradation	A reduction in the capacity of a forest to provide goods and environmental services. "Capacity" includes the maintenance of the elasticity of ecosystem structures and functions
Forest-dependent species	Species unable to complete at least one part of their life cycles outside the forest
Forest fallow	The intermediate time between two periods of shifting agriculture. In a functional shifting agriculture system, the fallow period is long enough that a functional secondary forest stand can develop (ie >20 years)
Forest governance	The process of governance in a forest area
Forest management unit	A clearly defined forest area managed to a set of explicit objectives according to a long-term management plan. It may be a large contiguous forest concession or community forest, or a group of small forestry operations, possibly with more than one owner; the unifying element is a common system of management
Forest rehabilitation	A management strategy applied in degraded forest lands that aims to restore the capacity of a forest to produce products and environmental services
Forest stakeholders	Individuals or groups directly or indirectly affected by, or interested in, a given forest resource and with a stake in it
Forest restoration	A management strategy applied in degraded forests with the aim of restoring the forest to its pre-degradation state (e.g. in function, structure and species composition)
Forest type	A naturally occurring community of trees and associated plant species of definite botanical composition with uniform physiognomy (structure) and growing in uniform ecological conditions whose species composition remains relatively stable over time
Forestry	The art and science of managing forests and trees, embracing a broad range of concerns such as the provision of wood and non-wood forest products, biodiversity management, wildlife habitat management, watershed management, water quality management, recreation, landscape protection, erosion control, employment, and carbon sequestration
Forest zoning	The classification of an area into production, restricted and protective zones based on the determined functions

Governance	The process of determining the way in which society is managed and how the competing priorities and interests of different groups are reconciled. It includes the formal institutions of government but also informal arrangements. Governance is concerned with the processes by which citizens participate in decision-making, how governments are accountable to their citizens, and how society obliges its members to observe its rules and laws (FAO 2009)
Indicator	A quantitative, qualitative or descriptive attribute that, when measured or monitored periodically, indicates the direction of change in a criterion
Invasive species	A species not native to a particular ecosystem whose introduction causes or is likely to cause economic or environmental harm or harm to human health
Landscape	A cluster of interacting ecosystem types, either pristine or modified by humans
Liberation (of future crop trees)	A cutting that releases young seedlings, saplings and trees in the canopy C-layer from overhead competition
Managed/modified natural forest	Natural forests managed or exploited for wood or non-wood forest products, wildlife or other purposes. The more intensive the use, the more that forest structure and composition is altered compared with primary forests. Ecologically, such alterations often represent shifts to earlier successional stages. Two major categories can be distinguished: managed primary forest, and degraded and secondary forests
Natural forest	Forest composed of native species and in which trees regenerate by self-sown seeds or natural vegetative means
Native species	Species that grow naturally in the wild in a particular region
Natural regeneration	Renewal of trees by self-sown seeds or natural vegetative means (Ford-Robinson, cited in Wadsworth 1997)
Non-timber forest products	Goods of biological origin other than timber (i.e. they may include woodfuel) derived from forests, other wooded land and trees outside forests (see categories below)
Non-wood forest products	Goods of biological origin other than wood (i.e. they exclude woodfuel) derived from forests, other wooded land and trees outside forests
Nutrient cycle	A natural process in which nutrients, mainly minerals, are taken up from the soil, used for plant growth and, once the plant dies, returned to the soil through decomposition processes
Permanence of carbon stocks	The capacity for maintaining existing forest carbon stocks and for continuous carbon sequestration by avoiding deforestation and forest degradation and deploying sustainable forest management

Permanent forest estate	Land, whether public or private, secured by law and kept under permanent forest cover. This includes land for the production of timber and other forest products, for the protection of soil and water, and for the conservation of biodiversity, as well as land intended to fulfil a combination of these functions. The main categories of the permanent forest estate are protection and production
Planted forest	A forest stand established by planting or seeding
Primary forest	Forest that has never been subject to human disturbance, or has been so little affected by hunting, gathering and tree-cutting that its natural structure, functions and dynamics have not undergone any changes that exceed the elastic capacity of the ecosystem
Production permanent forest estate	That part of the permanent forest estate assigned to the production of wood and/or to other extractive uses
Protected area	An area of land and/or sea especially dedicated to the protection and maintenance of biodiversity, and of natural and associated cultural resources, and managed through legal or other effective means
Protection permanent forest estate	That part of the permanent forest estate in which the production of wood (and commonly other extractive uses) is prohibited
Readiness preparation proposal	A working process, endorsed at the national level, to prepare a country for the implementation of REDD+ through multistakeholder consultation processes to define a national REDD+ strategy, including the definition of a forest carbon reference level and the monitoring, reporting and verification process needed to implement the REDD+ strategy
REDD+	Policy approaches and incentives for reducing emissions from deforestation and forest degradation, including the role of conservation, sustainable management of forests and enhancement of forest carbon stocks
Reforestation	The re-establishment of trees and understorey plants at a site immediately after the removal of natural forest cover
Resilience	The capacity of a forest ecosystem or landscape to maintain or regain a desired ecological condition following disturbance
Secondary forest	Woody vegetation regrowing on land that was largely cleared of its original forest cover. Secondary forests commonly develop naturally on land abandoned after shifting cultivation, settled agriculture, pasture, and failed tree plantations
Silviculture/silvicultural	Pertaining to the art and science of producing and tending forests by manipulating their establishment, species composition, structure and dynamics to fulfil given management objectives
Shifting agriculture	The burning and cleaning of forest vegetation and the subsequent plantation of agricultural crops for a short period of time (1–5 years) followed by abandonment (used here as a synonym for shifting or swidden cultivation)

Succession	Progressive change in species composition and forest structure caused by natural processes over time
Sustainable forest management	The process of managing forest to achieve one or more clearly specified objectives of management with regard to the production of a continuous flow of desired forest products and services without undue reduction of its inherent values and future productivity and without undesirable effects on the physical and social environment
Sustainable yield	The volume of wood or other product that may be removed from a forest annually, which is equal to or less than the rate of replacement in a given area over the long term
Tenure	Agreement(s) held by individuals or groups, recognized by legal statutes and/or customary practice, regarding the rights and duties of ownership, holding, access to or use of a particular land unit or the associated resources (such as individual trees, plant species, water or minerals) therein
Use rights	Rights to the use of (forest) resources as defined by local custom or agreements or prescribed by other entities holding access rights. These rights may restrict the use of particular resources to specific harvesting levels or specific extraction techniques
Yield regulation	The technique for calculating and controlling the sustainable yield (e.g. of wood)

Non-wood forest product categories

Categories	**Material**	**End use**
Animal fodder	Leaves, twigs	Fodder
Fibre	Rattan, bamboo, lianas, cork	Construction, crafts
Foodstuff (animal based)	Bushmeat, wild game, insects, honey, snails, etc.	Food, trophies
Foodstuff (plant based)	Fruits, leaves, vegetables, fungi/ mushrooms, nuts/seeds, berries, roots	Food, oils, drinks, colouring and dye
Gum and sap	Latex, rubbers, gums, resins, chemicals	Chemical raw materials
Medicinal	Medicinal plants and aromatic herbs, spices	Medicine, flavouring, fragrance

Annex 3: IUCN protected-area management categories[6]

IUCN has defined the following six protected-area management categories based on management objective:

Category Ia: Strict Nature Reserve are strictly protected areas set aside to protect biodiversity and also possibly geological/geomorphical features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values. Such protected areas can serve as indispensable reference areas for scientific research and monitoring.

Category Ib: Wilderness Area are usually large unmodified or slightly modified areas, retaining their natural character and influence without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition.

Category II: National Park are large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible, spiritual, scientific, educational, recreational, and visitor opportunities.

Category III: Natural Monument or Feature are set aside to protect a specific natural monument, which can be a landform, sea mount, submarine cavern, geological feature such as a cave or even a living feature such as an ancient grove. They are generally quite small protected areas and often have high visitor value.

Category IV: Habitat/Species Management Area aim to protect particular species or habitats and management reflects this priority. Many Category IV protected areas will need regular, active interventions to address the requirements of particular species or to maintain habitats, but this is not a requirement of the category.

Category V: Protected Landscape/ Seascape area where the interaction of people and nature over time has produced an area of distinct character with significant, ecological, biological, cultural and scenic value: and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values.

Category VI: Protected area with sustainable use of natural resources, conserve ecosystems and habitats together with associated cultural values and traditional natural resource management systems. They are generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management and where low-level non-industrial use of natural resources compatible with nature conservation is seen as one of the main aims of the area.

6 Available at: www.iucn.org/about/work/programmes/gpap_home/gpap_quality/gpap_pacategories.

Annex 4: IUCN Red List categories and criteria

The full text of the IUCN Red List categories is available at: www.iucnredlist.org/static/categories_criteria_3_1#categories.

Red List species categories:

- **EXTINCT (EX)**
- **EXTINCT IN THE WILD (EW)**
- **CRITICALLY ENDANGERED (CR)**
- **ENDANGERED (EN)**
- **VULNERABLE (VU)**
- **NEAR THREATENED (NT)**
- **LEAST CONCERN (LC)**

Further:

- **DATA DEFICIENT (DD)**

  A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat.

- **NOT EVALUATED (NE)**

  A taxon is Not Evaluated when it is has not yet been evaluated against any criteria.

Annex 5: The CITES Appendices

Appendices I, II and III to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) are lists of species afforded different levels or types of protection from over-exploitation.

Appendix I lists species that are the most endangered among CITES-listed animals and plants. They are threatened with extinction and CITES prohibits international trade in specimens of these species except when the purpose of the import is not commercial, for instance for scientific research. In these exceptional cases, trade may take place provided it is authorized by the granting of both an import permit and an export permit (or re-export certificate). Article VII of the Convention provides for a number of exemptions to this general prohibition.

Appendix II lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled. It also includes so-called "look-alike species", i.e. species whose specimens in trade look like those of species listed for conservation reasons. International trade in specimens of Appendix-II species may be authorized by the granting of an export permit or re-export certificate. No import permit is necessary for these species under CITES (although a permit is needed in some countries that have taken stricter measures than CITES requires). Permits or certificates should only be granted if the relevant authorities are satisfied that certain conditions are met, above all that trade will not be detrimental to the survival of the species in the wild.

Appendix III is a list of species included at the request of a Party that already regulates trade in the species and that needs the cooperation of other countries to prevent unsustainable or illegal exploitation. International trade in specimens of species listed in this Appendix is allowed only on presentation of the appropriate permits or certificates.

Species may be added to or removed from **Appendix I** and **II**, or moved between them, only by the Conference of the Parties, either at its regular meetings or by postal procedures. Species may be added to or removed from **Appendix III** at any time and by any Party unilaterally (although the Conference of the Parties has recommended that changes be timed to coincide with amendments to Appendices I and II).

The names of species in the Appendices may be annotated to qualify the listing. For example, separate populations of a species may have different conservation needs and be included in different Appendices (e.g. the wolf populations included in Appendix I are only those of Bhutan, India, Nepal and Pakistan, whereas all others are included in Appendix II). Such specifications can appear next to the species name or in the Interpretation section. For this reason, the Appendices should always be consulted alongside the Interpretation with which they are presented.

Parties may enter reservations with respect to any species listed in the Appendices in accordance with the provisions of Articles XV, XVI or XXIII of the Convention.

Source: www.cites.org/eng/app/index.php.

Annex 6: Ownership and management rights of forests

Ownership

Term	Definition	Explanatory notes
Forest ownership	Generally refers to the legal right to freely and exclusively use, control, transfer or otherwise benefit from a forest. Ownership can be acquired through transfers such as sales, donations and inheritance	Forest ownership refers to the ownership of the trees growing on land classified as forest, regardless of whether the ownership of these trees coincides with the ownership of the land itself
Public ownership	Forest owned by the state or administrative units of the public administration, or by institutions or corporations owned by the public administration	Includes all the hierarchical levels of public administration within a country, e.g. state, province and municipality. Shareholder corporations that are partially state-owned are considered as under public ownership when the state holds a majority of the shares. Public ownership may exclude the possibility to transfer
Public ownership by the state at the national level	Forest owned by the state at the national scale or by administrative units of the public administration, or by institutions or corporations owned by the public administration	
Public ownership by the state at subnational government scale	Forest owned by the state at the subnational government scale, by administrative units of the public administration, or by institutions or corporations owned by the public administration	
Private ownership	Forest owned by individuals, families, communities, private cooperatives, corporations and other business entities, private religious and educational institutions, pension or investment funds, non-governmental organizations, nature conservation associations or other private institutions	
Private ownership by individuals	Forest owned by individuals and families	
Private ownership by private business entities and institutions	Forest owned by private corporations, cooperatives, companies and other business entities, as well as private organizations such as NGOs, nature conservation associations, and private religious and educational institutions, etc.	Includes both profit and non-profit entities and institutions

Private ownership by local, tribal and indigenous communities	Forest owned by a group of individuals belonging to the same community residing within or in the vicinity of a forest area, or forest owned by communities of indigenous or tribal people. The community members are co-owners who share exclusive rights and duties, and benefits contribute to the community development	Indigenous and tribal people include: people regarded as indigenous on account of their descent from the population which inhabited the country, or a geographical region to which the country belongs, at a time of conquest or colonization or the establishment of present state boundaries and who, irrespective of their legal status, retain some or all their own social, economic, cultural and political institutions; and tribal people whose social, cultural and economic conditions distinguish them from other sections of the national community, and whose status is regulated wholly or partly by their own customs or traditions or by special laws and regulations
Unknown ownership	Forest area where ownership is unknown includes areas where ownership is unclear or disputed	

Management rights

Term	Definition
Management rights by public administration	The public administration (or institutions or corporations owned by the public administration) retains management rights and responsibilities within the limits specified by the legislation
Management rights by individuals/households	Forest management rights and responsibilities are transferred from the public administration to individuals or households through long-term leases or management agreements
Management rights by private companies	Forest management rights and responsibilities are transferred from the public administration to corporations, other business entities, private cooperatives, private non-profit institutions and associations, etc., through long-term leases or management agreements
Management rights by communities	Forest management rights and responsibilities are transferred from the public administration to local communities (including indigenous and tribal communities) through long-term leases or management agreements
Other forms of management rights	Forests for which the transfer of management rights does not belong to any of the categories mentioned above

Source: Adapted from FAO (2015).

Criteria and indicators (C&I) for sustainable forest management (SFM) are arguably one of the most important and innovative policy instruments for operationalizing the concept of SFM. Criteria characterize the essential components of SFM, and indicators are ways of assessing those components. When monitored over time, C&I show changes and trends in the biophysical, socioeconomic and policy conditions relevant to SFM.

ITTO pioneered the development of C&I in tropical forests in the early 1990s with the aim of enabling the assessment of the condition of tropical forests in producer member countries and identifying weaknesses in forest practices and the improvements needed. Since then, nine C&I schemes covering some 150 countries have been established, collectively encompassing all the world's major ecozones.

The aim of this revised edition of ITTO's C&I is to ensure that this instrument continues to meet the evolving needs of tropical forest stakeholders and to comprehensively inform the development of tropical forest policies and management practices. Among other things, it will help tropical countries in reporting to ITTO and other processes, such as the Sustainable Development Goals, and in establishing baselines for REDD+.

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