ITTO Policy Development Series No.7

CRITERIA AND INDICATORS

FOR SUSTAINABLE MANAGEMENT OF NATURAL TROPICAL FORESTS

INTERNATIONAL TROPICAL TIMBER ORGANIZATION
ORGANISATION INTERNATIONALE DES BOIS TROPICAUX
ORGANIZACION INTERNACIONAL DE LAS MADERAS TROPICALES

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FOREWORD

This publication, "Criteria and Indicators for Sustainable Management of Natural Tropical Forests" marks further progress in the work and activities of the International Tropical Timber Organization (ITTO) to promote the conservation, management and sustainable development of tropical forests within the framework of the International Tropical Timber Agreement of 1994. It builds upon ITTO's pioneering "Criteria for the Measurement of Sustainable Tropical Forest Management" adopted by the entire membership of the ITTO at the end of 1991 and published in March 1992. Equally, it is significant because it was negotiated in the ITTO forum whose membership accounts for the bulk of the world's tropical forests and almost all the trade in tropical timber. In the discussions to formulate and adopt these Criteria and Indicators, representatives of non-governmental conservation organizations and timber trade associations were actively involved from the beginning when an Expert Panel was established to develop a draft.

During the process of developing these Criteria and Indicators the definition, theory and procedure for 'principles', 'criteria', indicators' and 'measurements' were discussed and some common standards accepted. ITTO's initial Criteria and Indicators, being the first of its kind, served an important role in the evolving process in pursuit of the sustainable management of tropical forests, particularly in the context of the ITTO year 2000 Objective, providing a focus and urgency for action, international cooperation and assistance.

By decision of the ITTO Council in November 1996 two consultants, Professor Duncan Poore (United Kingdom) and Mr. Thang Hooi Chiew (Malaysia), were engaged to draft a new set of Criteria and Indicators. The draft was further elaborated by two Expert Panels under the leadership of Mr. Don Wijewardana (New Zealand) and discussed during the Council Session in December 1997 and finally adopted at the following Council Session in Libreville, Gabon in May, 1998 after further deliberations.

It is with great pleasure that I introduce this new and revised set of ITTO's "Criteria and Indicators for Sustainable Management of Natural Tropical Forests". As with the earlier version, it is my hope that these revised Criteria and Indicators will receive wide recognition and application, and that they will form the basis for Members to report to Council enabling it to confer annually on progress towards the ITTO year 2000 Objective. The discussions will also provide feedback on the use of these Criteria and Indicators, enabling their refinement and revision based on actual field experience.

It is also the intention of the Organization to develop a manual of instructions to make the revised Criteria and Indicators user-friendly by giving suggestions and guidelines on how to measure the level of the indicators whether quantitative or qualitative. However, considering the enormous differences between the countries and forests of the producer Member countries, this will be a challenging task.

The adoption of the these "Criteria and Indicators for Sustainable Management of Natural Tropical Forests" is another major milestone and contribution by the ITTO to assist its Member countries to sustainably manage their tropical forests in conjunction with the various ITTO guidelines.

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Yokohama
6 July 1998

CRITERIA AND INDICATORS FOR SUSTAINABLE MANAGEMENT OF NATURAL TROPICAL FORESTS

I. INTRODUCTION

(1) This publication updates *ITTO's Criteria for the Measurement of Sustainable Tropical Forest Management* which was published in March 1992. It benefits from the experience gained by tropical countries in implementing the *ITTO Guidelines for the Sustainable Management of Natural Tropical Forests* and *ITTO Criteria for the Measurement of Sustainable Tropical Forest Management.* It also reflects developments over the last five years which have improved understanding of the components of sustainable forest management.

(2) Since ITTO undertook its pioneering work in the early 1990s, several international and regional initiatives on criteria and indicators for sustainable forest management have emerged, stemming from the UN Conference on Environment and Development held in Rio de Janeiro in June 1992. These initiatives involve more than 100 countries and include the Pan-European Helsinki Process, the Montreal Process for temperate and boreal forests, the Tarapoto Proposal for the Amazon, and regional initiatives for Dry-Zone Africa, the Near East, Central America and the African Timber Organization. In February 1997, the UN Commission on Sustainable Development's Intergovernmental Panel on Forests endorsed the concept of criteria and indicators for sustainable forest management and called on all countries to become involved in implementing them.

(3) In view of these developments, the International Tropical Timber Council determined that the time had come to update ITTO's Criteria and Indicators in order to make them more operational and useful. Moreover, the original ITTO criteria and indicators focused primarily on sustainable management for the *production of timber* while this update covers the full range of forest goods and services, including biological diversity and other non-timber values. Meanwhile, the *ITTO Guidelines for the Establishment and Sustainable Management of Planted Tropical Forests* and *ITTO Guidelines for the Conservation of Biological Diversity in Tropical Production Forests*, published respectively in January and September 1993, laid the foundation for a wider interpretation of sustainable forest management by ITTO. More recently, in September 1997, ITTO has published the *ITTO Guidelines on Fire Management in Tropical Forests.*

(4) Natural forests are a very important renewable natural resource in most tropical countries; they produce the bulk of tropical timber, are very rich in biodiversity and provide many other socio-economic, cultural and environmental benefits. This publication concentrates, therefore, on the identification and formulation of criteria and indicators for assessing progress towards the sustainable management of **natural** tropical forests. Reference to planted forests is only made when their management is relevant in supporting the sustainable management of natural forests.

(5) Although the criteria for both types of forest are the same, there are many features in natural tropical forests which do not occur or are of little significance in planted forests; and, conversely, many important features in the management of plantations (selection of site, species, genotype etc.) which do not apply in natural tropical forests. Appropriate criteria and indicators are, of course, also important in assessing the management of planted forests.

The Purpose of Criteria and Indicators

(6) The purpose of ITTO's Criteria and Indicators is to provide member countries with an improved tool for assessing changes and trends in forest conditions and management systems at the national and forest management unit levels. By identifying the main elements of sustainable forest management, the criteria and indicators provide a means of assessing progress towards the ITTO Year 2000 Objective: "To enhance the capacity of members to implement a strategy for achieving exports of tropical timber and timber products from sustainably managed sources by the year 2000", as well as a tool for tracking progress into the next century. The Year 2000 Objective is enshrined in the current International Tropical Timber Agreement of 1994 (Chapter I, Article 1 (d)), which entered into force on 1 January 1997, and establishes a special funding mechanism known as the Bali Partnership Fund to assist producer member countries in achieving the Year 2000 Objective (Chapter VI, Article 21).

(7) These indicators identify the information needed to monitor change, both in the forest itself (outcome indicators) and in the environmental and forest management systems used (input and process indicators). If the values of any indicator are placed in a time sequence, they provide information on the direction of change, either towards or away from sustainable forest management. The indicators cannot, however, by themselves, establish *whether* management is or is not sustainable.

(8) The information generated, through using these Criteria and Indicators in assessing the state of the forest, will help policy- and decision-makers to communicate the status of the efforts towards sustainable forest management more effectively to the public. It will also assist in developing policies and strategies for sustainable forest management, in focusing research efforts where knowledge is still deficient, and in identifying those areas which are in special need of international assistance and co-operation.

(9) If the indicators are made operational and appropriate prescriptions and standards are set, a sound basis would be created for measuring sustainable forest management. It should be emphasised that determination of sustainability, and therefore the indicators identified, should be specific to each nation or to each management unit.

(10) The Criteria and Indicators identified in this document should be reviewed and refined periodically to benefit from experience and to reflect new concepts of sustainable forest management. This revision should take into account evolving knowledge about the functioning of forest ecosystems, human impacts on the forests whether planned or unplanned and the changing needs of society for forest goods and services. Moreover, the capability to measure indicators will increase and knowledge will improve about the nature of 'best' indicators to assess forest management.

Levels of Application

(11) This document covers criteria and indicators for both the national level and the level at which the forest is managed. In large countries, and those with a federal structure, it may be helpful to use indicators at a lower level than the nation (states or provinces), and to aggregate these to provide a description of the whole nation. The size of the forest management unit may also vary greatly, depending on such factors as forest administrative structures and forest ownership or landscape patterns. Each country must make its own decisions about how to approach these questions.

(12) All the criteria are valid at both the national level and the level of the forest management unit. In the case of the indicators, all are applicable at the national level but only some at the level of the forest management unit. The two sets are presented together. The level at which an indicator applies is noted with a "+"; if it does not apply, with a "-".

(13) It is important to address the subject at both these levels for two reasons. First, the overall sustainability of the management of a nation's forests depends substantially upon actions taken at the national level, such as decisions on the balance of land use between forestry and other land uses and, within forestry, between production, conservation and protection. Secondly, the evaluation of sustainable forest management at the national level depends upon the quality of management of the aggregate of all forest management units.

The Criteria

(14) A criterion describes a state or situation which should be met to comply with sustainable forest management. Ideally, this meaning should be reflected in the way criteria are formulated. In this publication, however, for reasons of easy communication and simplicity, the criteria themselves are formulated as subjects of attention, while the full meaning of the criterion is elaborated in accompanying text.

(15) Seven criteria are identified as essential elements of sustainable forest management. 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. Criteria 2 and 3 on ***Forest Resource Security*** and ***Forest Ecosystem Health and Condition***, respectively, are concerned with the quantity, security and quality of forest resources. The remaining four criteria deal with the various goods and services provided by the forest, including ***Flow of Forest Produce, Biological Diversity, Soil and Water*** and ***Economic, Social, and Cultural Aspects***. The order of presentation of the criteria represents a logical sequence but does not indicate priority or relative importance. The seven ITTO criteria are shown schematically in Appendix 1.

The Indicators

(16) The indicators presented here have been carefully identified and formulated so that a change in any one of them would give information that is both necessary and significant in assessing progress towards sustainable forest management. They have also been defined so that they are clear, practical and easy to monitor, and based as far as possible on available research knowledge and statistics. It should, therefore, be possible for countries to provide information on many of them, although only a few countries will immediately be able to provide information on them all.

(17) Countries face a considerable load in reporting to different international organisations. This load can be eased by ensuring that the nature of the data required is as similar as possible. Indicators have, therefore, been chosen so as to be compatible with those being requested for FAO's Forest Resources Assessment (FRA-2000).

(18) Wherever possible, quantitative indicators have been suggested but, in some instances, this is not possible or would prove too expensive. Where this is the case, qualitative or descriptive indicators are provided.

(19) It is important, if the indicators are to give an accurate picture of trends, that comparable methods should be used between one time of assessment and the next; and that there should be a means of estimating the degree of accuracy of any data presented. Over time, lessons will be learnt about the collection of certain data. Ideally, all countries should use the same methods of measurement and assessment, but this is unlikely to be for some time. Countries should, therefore, give a description of the methods used and an estimate of the accuracy of their figures and any difficulties encountered in their collection.

II. DEFINITIONS

The following are definitions of some important terms as they are used in this publication. If the definitions currently used in any reporting country differ from these, the country should give references or quote its own definitions.

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 part; this includes diversity within species, between species and of ecosystems. (Source: The Convention on Biological Diversity)

Criterion

An aspect that is considered important by which sustainable forest management may be assessed. A criterion is accompanied by a set of related indicators.

Forest Management Unit

A forest management unit (FMU) is a clearly defined forest area, managed to a set of explicit objectives and according to a long-term management plan.

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. These are most often scientifically described at the 'association' level.

Indicator

A quantitative, qualitative or descriptive attribute that, when periodically measured or monitored, indicates the direction of change.

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 biological diversity, as well as land intended to fulfil a combination of these functions.

Sustainable Forest Management

Sustainable forest management is 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 undue undesirable effects on the physical and social environment.

III. CRITERIA AND INDICATORS

Criterion 1: Enabling Conditions for Sustainable Forest Management

This criterion covers the general institutional requirements for sustainable forest management to succeed. It addresses policy, legislation, economic conditions, incentives, research, education, training and mechanisms for consultation and participation. Many of the indicators are necessarily descriptive. Taken together, the information gathered indicates the extent of a country's political commitment to sustainable forest management. It would be useful if countries could supplement the indicators by providing relevant documentation.

Indicators		National	FMU
Policy and Legal Framework			
1.1	Existence of a framework of laws, policies, and regulations to govern:		
	(a) national objectives for forest including production, conservation and protection,	+	-
	(b) the establishment and security of the permanent forest estate,	+	-
	(c) land tenure and property rights relating to forests,	+	-
	(d) the control of forest management,	+	-
	(e) the control of forest harvesting,	+	-
	(f) the control of encroachment,	+	-
	(g) the health and safety of forest workers, and	+	-
	(h) the participation of local communities.	+	-
Economic Framework			
1.2	Amount of investment and reinvestment in forest management, administration, research, and human resource development from:		
	(a) national and sub-national governmental sources,	+	+
	(b) the Bali Partnership Fund,	+	-
	(c) other international governmental contributions, and	+	+
	(d) private sources, domestic and foreign.	+	+
1.3	Existence of economic instruments and other incentives to encourage sustainable forest management.	+	+

Indicators		National	FMU
Institutional Framework			
1.4	Number and adequacy of institutions to support sustainable forest management.	+	-
1.5	Number and adequacy of trained professional and technical personnel at all levels to perform and support management, implementation, research and extension.	+	+
1.6	Existence and application of appropriate technology to practise sustainable forest management and the efficient processing and utilisation of forest produce.	+	+
1.7	Capacity and mechanisms for planning sustainable forest management and for periodical monitoring, evaluation and feed-back on progress.	+	+
1.8	Degree of public [1] participation in forest management, such as in planning, decision making, data collection, monitoring and assessment.	+	+
1.9	Adequacy and timeliness of information to increase public awareness about forest policies, legislation and sustainable forest management practices.	+	+

[1] This is taken to include all interested parties, individuals, communities, organisations etc.

Criterion 2: Forest Resource Security

This criterion relates to the extent to which a country has a secure and stable forest estate, which could include plantations, to meet the production, protection, biodiversity conservation and other social, cultural, economic and environmental needs of present and future generations. This is essential for long-term sustainable forest management.

	Indicators	**National**	**FMU**
	Description of Resource Base		
2.1	Extent (area) and percentage of total land area under:		
	(a) natural forest,	+	+
	(b) plantation forest,	+	+
	(c) permanent forest estate, and	+	+
	(d) comprehensive integrated land-use plans.	+	+
2.2	Extent (area) and percentage of total land area under each forest type[2].	+	+
2.3	Length and percentage of external boundaries of the permanent forest estate demarcated or clearly defined.	+	+
2.4	Area of the permanent forest estate converted to permanent non-forest use.[3]	+	+
	Protection Procedures		
2.5	Existence of procedures to control encroachment, fire, grazing and illegal exploitation of forests.	+	+

[2] Each country should use the classification of forest types available to it which is most suitable for giving an assessment of biological diversity (i.e. a classification based on species composition, if available, is more useful than one based on forest structure; and a classification based on localised forest communities is more useful than one based on broad regional categories).

[3] The baseline for this indicator should be the extent of the permanent forest estate at the time of a country's first report. It is only in subsequent reports that changes can be recorded.

Criterion 3: Forest Ecosystem Health and Condition

This criterion relates to the condition of a country's forests and the healthy biological functioning of forest ecosystems. Forest condition and health can be affected by a variety of human actions and natural occurrences, from air pollution, fire, flooding and storms to insects and disease.

Indicators		National	FMU
Area of Forest Damaged by Human Activities and Degree of Damage			
3.1	Within the permanent forest estate, the extent and nature of:		
	(a) encroachment,	+	+
	(b) agriculture,	+	+
	(c) roads,	+	+
	(d) mining,	+	+
	(e) dams,	+	+
	(f) unplanned fire,	+	+
	(g) shifting agriculture,	+	+
	(h) nomadic grazing,	+	+
	(i) illegal exploitation,	+	+
	(j) inappropriate harvesting practices,	+	+
	(k) harvesting more than once during the cutting cycle (re-entry),	+	+
	(l) hunting, and	+	+
	(m) other forms of forest damage such as change in hydrological regime, pollution, introduction of harmful exotic plant and animal species, browsing and grazing. (These should be specified.)	+	+
Area and Degree of Forest Damage by Natural Causes			
3.2	Within the permanent forest estate, the extent and nature of forest damage, caused by:		
	(a) wild fire,	+	+
	(b) drought,	+	+
	(c) storms or natural catastrophes,	+	+
	(d) pests and diseases, and	+	+
	(e) other natural causes.	+	+
Conservation and Protection Procedures[4]			
3.3	Existence and implementation of quarantine and phytosanitary procedures to prevent the introduction of pests and diseases.	+	-

[4] Many further procedures are listed under other criteria.

Indicators		National	FMU
3.4	Existence and implementation of procedures to prevent the introduction of potentially harmful exotic plant and animal species.	+	-
3.5	Availability and implementation of procedures covering:		
	(a) use of chemicals in the forest, and	+	+
	(b) fire management.	+	+

Criterion 4: Flow of Forest Produce

This criterion is concerned with forest management for the production of wood and non-wood forest products. Such production can only be sustained in the long-term if it is economically and financially viable, environmentally sound and socially acceptable.

Forests earmarked for production are able to fulfil a number of other important forest functions, such as environmental protection and the conservation of biological diversity. These multiple roles of forest 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.

Indicators		National	FMU
Resource Assessment			
4.1	Extent and percentage of forest for which inventory and survey procedures have been used to define:		
	(a) the quantity of the main forest products, and	+	+
	(b) resource rights and ownership.	+	+
4.2	Estimate of level of sustainable harvest for each main wood and non-wood forest product for each forest type.	+	+
4.3	Quantity (volume) of wood and important non-wood forest products harvested for each forest type.	+	+
Planning Procedures			
4.4	Existence and implementation of:		
	(a) forest management plans, and	+	+
	(b) forest harvesting (operational) plans.	+	+
4.5	Extent and percentage of :		
	(a) production forest covered by management plans, and	+	+
	(b) compartment/coupes harvested according to harvesting (operational) plans.	+	+

Indicators		National	FMU
4.6	Existence of long-term projections, strategies and plans for production, including the use of tree plantations.	+	+
4.7	Availability of historical records on the extent, nature and management of forest.	+	+
	Management Guidelines		
4.8	Availability and implementation of management guidelines for each of the main wood and non-wood forest products to be harvested, to cover:		
	(a) the assessment of natural regeneration, and	+	+
	(b) measures to supplement natural regeneration where necessary.	+	+
4.9	Availability and implementation of procedures to monitor and review the management guidelines.	+	+
4.10	Availability and implementation of guidelines for reduced/low impact logging to minimise damage to residual stand.	+	+
	Monitoring and Evaluation		
4.11	Availability and implementation of:		
	(a) procedures for comprehensive evaluation of the implementation of management guidelines,	+	+
	(b) procedures to assess damage to the residual stand, and	+	+
	(c) post-harvest surveys to assess the effectiveness of regeneration.	+	+
4.12	Percentage of area harvested for which:		
	(a) management guidelines have been completely implemented, and	+	+
	(b) post-harvest surveys have been conducted to assess the effectiveness of regeneration.	+	+

Criterion 5: Biological Diversity

This Criterion relates to the conservation and maintenance of biological diversity, including ecosystem, species and genetic diversity. At the species level, special attention should be given to the protection of endangered, rare and threatened species. The establishment and management of a geographic system of protected areas of representative forest ecosystems can contribute to maintaining biodiversity. Biological diversity can also be conserved in forests managed for other purposes, such as for production, through the application of appropriate management practices.

Indicators		**National**	**FMU**
Ecosystem Diversity			
5.1	Statistics of protected areas[5] in each forest type.		
	(a) number,	+	-
	(b) extent,	+	-
	(c) percentage of forest type covered,	+	-
	(d) range of sizes and average size of protected area, and	+	-
	(e) percentage of boundaries demarcated or clearly defined.	+	-
5.2	Percentage of total number of protected areas connected by biological corridors or 'stepping stones' between them.	+	-
Species Diversity			
5.3	Existence and implementation of procedures to identify endangered, rare and threatened species[6] of forest flora and fauna.	+	+
5.4	Number of endangered, rare and threatened forest dependant species.	+	+
5.5	Percentage of original range occupied by selected endangered, rare and threatened species.	+	+

[5] According to the IUCN protected area categories I to VI, see Appendix 2.

[6] IUCN categories should be used where possible.

Indicators		National	FMU
Genetic Diversity			
5.6	Existence and implementation of a strategy for *in situ* and/or *ex situ* conservation of the genetic variation within commercial, endangered, rare and threatened species of forest flora and fauna.	+	+
Management Guidelines			
5.7	Existence and implementation of management guidelines to:		
	(a) keep undisturbed a part of each production forest,	+	+
	(b) protect endangered, rare and threatened species of forest flora and fauna, and	+	+
	(c) protect features of special biological interest, such as seed trees, nesting sites, niches and keystone species.	+	+
Monitoring and Evaluation			
5.8	Existence and implementation of procedures for assessing changes of biological diversity of the production forests, compared with areas in the same forest type kept free from human intervention.	+	+

Criterion 6: Soil and Water

This criterion deals with the protection of soil and water in the forest. The importance of this is two-fold. First, it has a bearing on maintaining the productivity and quality of forest and related aquatic ecosystems (and therefore on the health and condition of the forest, Criterion 3); secondly, it also plays a crucial role outside the forest in maintaining downstream water quality and flow and in reducing flooding and sedimentation. The environmental and social effects of mismanagement (landslides, flooding, water pollution) can be enormous and restoration very costly. National-level data for indicators will normally be derived from the aggregation of data collected periodically at the forest management unit level.

	Indicators	**National**	**FMU**
	Extent of Protection		
6.1	Extent and percentage of total forest area managed primarily for the protection of soil and water.	+	+
6.2	Extent and percentage of area to be harvested for which off-site catchment values have been defined, documented and protected before harvesting.	+	+
6.3	Extent and percentage of area to be harvested which has been defined as environmentally sensitive (e.g. very steep or erodible) and protected before harvesting.	+	+
6.4	Extent and percentage of area to be harvested for which drainage systems have been demarcated or clearly defined and protected before harvesting.	+	+
6.5	Percentage of length of edges of watercourses, waterbodies, mangroves and other wetlands protected by adequate buffer strips.	+	+
	Conservation and Protection Procedures		
6.6	Existence and implementation of procedures to identify and demarcate sensitive areas for the protection of soil and water.	+	+
6.7	Availability and implementation of guidelines for forest road lay-out, including drainage requirements and conservation of buffer strips along streams and rivers.	+	+

Indicators		National	FMU
6.8	Availability and implementation of harvesting procedures:		
	(a) to protect the soil from compaction by harvesting machinery, and	+	+
	(b) to protect the soil from erosion during harvesting operations.	+	+
Monitoring and Evaluation			
6.9	Existence and implementation of procedures for assessing changes in the water quality of streams emerging from production forests as compared with streams emerging from the same forest type kept free from human intervention.	+	+

Criterion 7: Economic, Social and Cultural Aspects

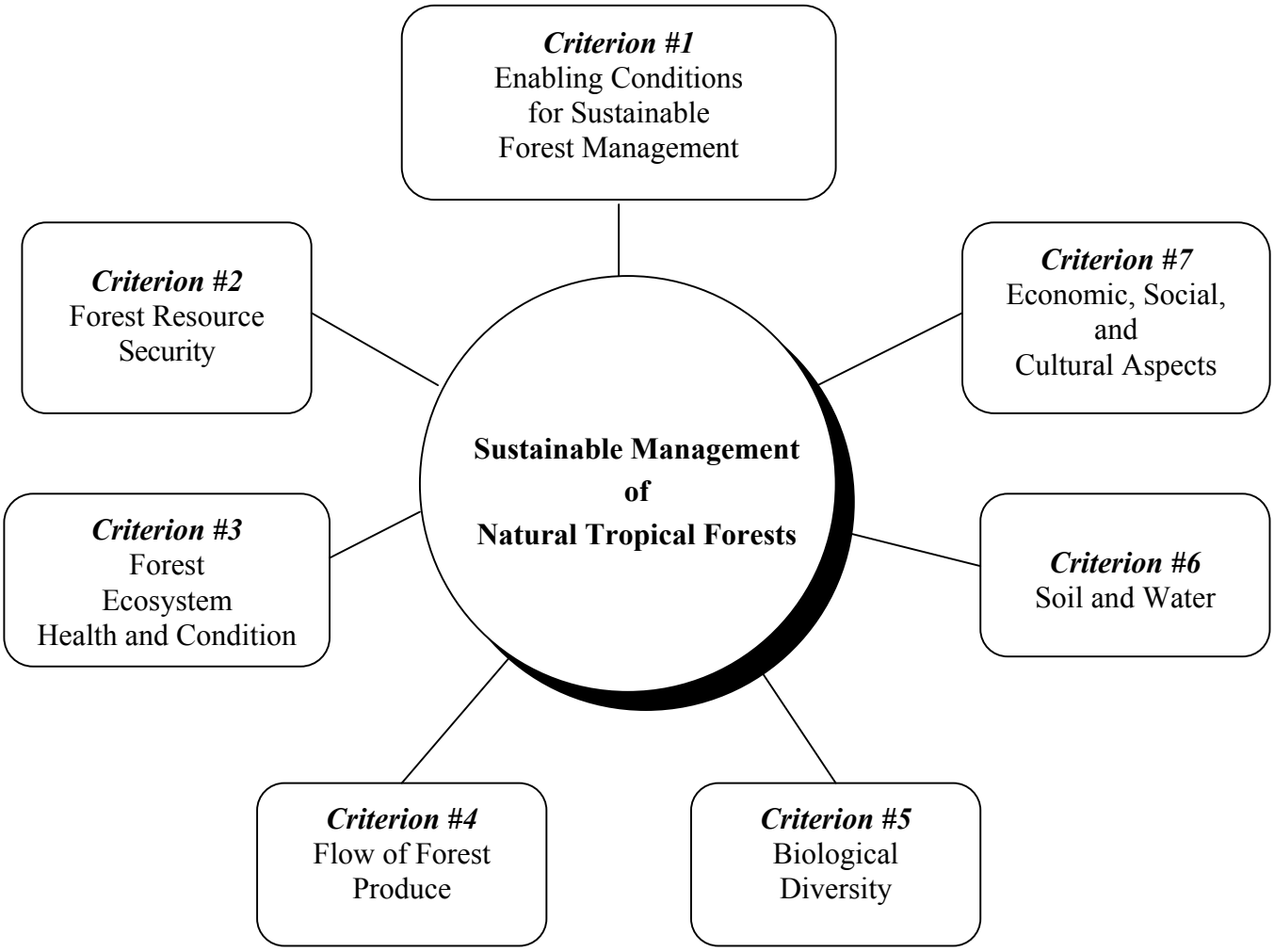
This criterion deals with the economic, social and cultural aspects of the forest, besides those mentioned under Criteria 4, 5 and 6. As a renewable resource, the forest has the potential, if sustainably managed, to make an important contribution to the sustainable development of the country.

	Indicators	**National**	**FMU**
	Socio-Economic Aspects		
7.1	Value and percentage contribution of the forestry sector to the Gross Domestic Product.	+	-
7.2	Quantity (volume) and value of wood and non-wood forest products traded in:		
	(a) the domestic market, and	+	+
	(b) the international market.	+	+
7.3	Quantity (volume) and value of wood and non-wood forest products for subsistence use, including fuelwood.	+	+
7.4	Ratio of domestic log production to the processing capacity of wood-based industries.	+	-
7.5	Efficiency of utilisation in terms of the percentage of felled volume processed.	+	+
7.6	Existence and implementation of mechanisms for the effective distribution of incentives and the fair and equitable sharing of costs and benefits among the parties involved.	+	+
7.7	Existence and implementation of procedures to ensure the health and safety of forest workers.	+	+
7.8	Employment in the forestry sector:		
	(a) number employed,	+	+
	(b) percentage of total work force,	+	-
	(c) average wage rate, and	+	-
	(d) injury rate.	+	+

Indicators		National	FMU
7.9	Number and extent of forest sites available primarily for:		
	(a) research,	+	-
	(b) education,	+	-
	(c) the direct use and benefit of local communities, and	+	+
	(d) recreation.	+	+
7.10	Number of people dependent on the forest for subsistence uses and traditional and customary lifestyles.	+	+
7.11	Area of forest upon which people are dependent for subsistence uses and traditional and customary lifestyles.	+	+
7.12	Number of visitors to forest for recreational purposes.	+	+
7.13	Total amount of carbon stored in forest stands.	+	-
Cultural Aspects			
7.14	Number of important archaeological and cultural sites identified, mapped and protected.	+	+
Community Participation			
7.15	Extent to which tenure and user rights over the forest are documented and recognised.	+	+
7.16	Extent to which forest planning and management practices and processes consider and recognise legal or customary rights with respect to indigenous people and local communities, forest dwellers and other forest-dependent communities.	+	+
7.17	Extent of participation by indigenous people and local communities, forest dwellers and other forest-dependent communities in forest-based economic activities.	+	+
7.18	Number of agreements involving local communities in co-management responsibilities.	+	+

Appendix 1

SCHEMATIC TABULATION OF CRITERIA



Appendix 2

Definitions of the Protected Area Categories[1] of the World Conservation Union (IUCN)

Classification schemes aid in the quantification of "protection" and "protected area," and thereby aid also in the identification of gaps in protection. This is an important step in building the common understanding necessary for the establishment of expansion of forest protected area networks. It is also a necessary complement to priority actions such as conducting forest inventories and assessments of management effectiveness within existing protected areas.

IUCN's protected area classification system was designed to facilitate the collection and dissemination of comparable data and to improve communication among countries, and to provide comparability between parks and protected areas in differing ecosystems and in different political, legal, and cultural contexts, by using *management objectives* as the basis for comparison. It provides sufficient flexibility to account for a range of possible combinations of management objectives, socio-economic contexts, and ecosystems.

IUCN defines a protected area as *an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means*. Under the IUCN definitions, the objective of protection must be the maintenance of biodiversity and natural resources, and there must be an explicit legal or social basis for protection activities. Multiple-use sites that combine attraction, recreation, and nature conservation can qualify, but 75% or more of the area included must be managed primarily for conservation purposes. Non-consumptive and low-intensity uses are compatible with some categories within the IUCN scheme (e.g., Category V and VI designations), but sites such as forest plantations managed primarily for timber production would not qualify.

IUCN has defined a series of protected area management categories based on management objective. Definitions of these categories, and examples of each, are provided *in Guidelines for Protected Area Management Categories* (IUCN, 1994). The six categories are:

> **CATEGORY Ia: Strict Nature Reserve: protected area managed mainly for science** Area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring.
>
> **CATEGORY Ib: Wilderness Area: protected area managed mainly for wilderness protection** Large area of unmodified or slightly modified land, and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition.

Category I sites are typically remote and inaccessible, and are characterized by being "undisturbed" by human activity. They are often seen as benchmark, or reference sites, and

[1] This paper was prepared by IUCN in February 1998, upon request by G-8 countries, as background information during the development of the G-8 Forest Action Programme. For further information please contact either David Sheppard at IUCN headquarter in Gland, Switzerland, or John Waugh at IUCN-U.S.

access is generally restricted or prohibited altogether. They range in size from vast areas to very small units (typically a "core" of a larger protected area). Selection should be on the basis of quality and significance.

> **CATEGORY II: National Park: protected area managed mainly for ecosystem protection and recreation** Natural area of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.

Category II covers National Parks and equivalent reserves. Category II sites are characterized by the experience of "naturalness". While managed to protect ecological integrity, Category II sites tend to serve to facilitate appreciation of the features protected, and typically include provisions for human visitors. Selection should be on the basis of representativeness and/or special significance, and sites should be large enough to contain one or more (relatively intact) ecosystems.

> **CATEGORY III: Natural Monument: protected area managed mainly for conservation of specific natural features** Area containing one, or more, specific natural or natural/cultural feature which is of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities or cultural significance.

Category III covers areas that are typically not of the scale of Category II sites, but can be important as protected components within a broader managed landscape for the protection of particular forest communities or species. Selection should be on the basis of the significance of the features, and should be of a scale that protects the integrity of that feature and its immediately related surroundings.

> **CATEGORY IV: Habitat/Species Management Area: protected area managed mainly for conservation through management intervention** Area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats and/or to meet the requirements of specific species.

Category IV covers areas managed mainly for conservation through management intervention; habitats and other features may be manipulated to enhance the presence of species or communities of species, through, for example, artificial wetlands or the cultivation of preferred food crops. Category IV sites do not include production units primarily for exploitation, such as forest plantations. Category IV sites should be selected on the basis of importance as habitats to the survival of species of local or national significance, where conservation of the species or habitat may depend upon its manipulation.

> **CATEGORY V: Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation** Area of land, with coast and sea as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, ecological and/or cultural value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.

Category V areas are characterized by a long-term socio-ecological interaction commensurate with high biodiversity values. Category V areas should be selected on the basis of diversity of habitats of high scenic quality combined with manifestations of unique or traditional land-use patterns and opportunities for public enjoyment through recreation and tourism.

> **CATEGORY VI: Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems** Area containing predominantly unmodified natural systems, managed to ensure long term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs.

Category VI areas are characterized by predominantly unmodified "natural systems" that are managed to provide both maintenance of biological diversity and a sustainable flow of natural products and services. The expression "natural system" can be interpreted many different ways. For purposes of the IUCN categories it can be taken to mean *"ecosystems where since the industrial revolution (1750) human impact (a) has been no greater than that of any other native species, and (b) has not affected the ecosystem's structure. Climate change is excluded from this definition."*[2] For an area to qualify for Category VI designation, not only must the site meet the definition of a protected area, but at least two-thirds of the site should be, and is planned to remain, in a natural condition. Large commercial plantations must not be included, and, as in all categories, a management authority must be in place. Category VI sites should also be large enough to absorb sustainable resource uses without detriment to the sites' overall long-term natural values.

Because many protected areas, particularly forest areas, are established for multiple objectives, at least three-quarters of a designated area must be managed primarily for one of the above management objectives in order for it to be listed under the corresponding category. The management of the remaining area must not be in conflict with that primary purpose. In cases where parts of a single management unit are classified by law as having different management objectives, or where one area is used to 'buffer' or surround another, they would be listed separately.

All protected areas must meet a test of management responsibility and ownership. Management authority may be through national government, local authority, informal community group, non-governmental organization, or private ownership, provided that it provides the capacity to achieve the given management objective. In general more strictly protected sites require state power for full protection, but recent experiments in vesting legal power in private entities for nature conservation objectives leave open the possibility of exceptions. Ownership of a unit must also be compatible with achievement of management objectives in order for the site to be listed.

* * *

[2] IUCN (1991), *Caring for the Earth; a strategy for survival.* IUCN, UNEP, WWF. Michell Beazley, London, 150 pp.

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