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MANUAL FOR THE APPLICATION OF CRITERIA AND INDICATORS FOR SUSTAINABLE MANAGEMENT OF NATURAL TROPICAL FORESTS

PART A / NATIONAL INDICATORS

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

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FOREWORD

The Manual on Criteria and Indicators for Sustainable Management of Natural Tropical Forests was prepared and published as part of the Organization's policy work, in the context of its broad mission of facilitating discussion, consultation and international co-operation on issues relating to the international trade and utilization of tropical timber and the sustainable management of its resource base.

This publication contains Part A of the Manual, designed as a simple guide to enable forest departments to measure and describe indicators at the national level. It is complemented by another ITTO publication (Policy Development Series Number 10), which presents the Manual's Part B, designed to guide and assist forest managers to describe the indicators at the Forest Management Unit level. The Manual (Parts A and B) was developed by ITTO to facilitate use of the ITTO Criteria and Indicators for Sustainable Management of Natural Tropical Forests (1998).

The Manual (Part A) provides a clear and detailed description of actions to be taken to measure and describe the 66 national level indicators adopted in the ITTO Criteria and Indicators for Sustainable Management of Natural Tropical Forests (1998). In this sense, the Manual is really a practical guide for action, and its use by national and state governments is essential to help them to assess their own progress towards sustainable forest management and to report on the status of their forests in an appropriate and standardized way.

The International Tropical Timber Council approved a decision providing for the preparation of this Manual during its Twenty-fourth Session held in Libreville, Gabon, in May 1998. ITTO engaged two consultants, Professor Duncan Poore (United Kingdom) and Mr. Thang Hooi Chiew (Malaysia) to prepare a draft of the Manual, which was subsequently considered and finalized by a panel of international experts, comprised of representatives from ITTO's tropical timber producing and consuming member countries. The panel, chaired by Dr. Untung Iskandar (Indonesia), produced a revised Manual, which was endorsed at the Twenty-sixth Council Session in Chiang Mai, Thailand, in June 1999. It is my pleasure and duty to acknowledge the dedication and painstaking work of the consultants and panel members who assisted ITTO in the preparation of the Manual.

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International Tropical Timber Organization (ITTO)

Yokohama, May 1999

PART A
NATIONAL INDICATORS

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INTRODUCTION

The purpose of the Manual

This Manual has been prepared to provide guidance to those responsible for compiling data on the Indicators set out in the ITTO publication *Criteria and Indicators for Sustainable Management of Natural Tropical Forests.* It contains instructions on how the required information should be assembled and presented. The Manual should be considered in conjunction with the ITTO publication, where a general discussion of the choice and use of Criteria and Indicators may be found.

The objective of Indicators

The objective of the Indicators is to provide member countries with an improved tool for assessing changes and trends in forest conditions and management systems. This may be accomplished by measuring or describing the Indicators at regular intervals. For, when the successive 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.

Manual in Two Parts - National Indicators and Forest Management Unit Indicators

To get a full picture of the evolving condition of the forest, it is necessary to examine changes (and therefore the Indicators) at both the national level and that of the forest management unit. Because the sources of information for these two levels are often different (the national values being frequently an aggregation of all the values from the forest management units) and because the work may be carried out by different staff, the Manual is divided for convenience into two parts:

- Part A – Indicators at National level.
- Part B – Indicators at Forest Management Unit level.

Parts A and B are very similar to one another but there are two differences:

- All the Indicators apply at the national level and therefore are included in Part A, while fewer Indicators apply at the level of the forest management unit. For clarity, the numbering of Indicators is identical in both parts and follows exactly the sequence in the ITTO publication. Those that do not apply at the forest management unit level are included in Part B but indicated as 'not applicable'.
- The instructions for completing data on the same Indicator may be different in the two Parts.

The format of the Manual

A standard format is adopted throughout the Manual.

- First, there is a description of the indicator (in italics). This text is identical to that in the ITTO publication.
- Next, are given instructions for compiling the required information. For some indicators, quantitative data are required and should be inserted in the table provided. For others, the instruction is in the form of a question YES or NO, followed by a request to provide further information on action taken or planned to be taken.

This format sets the framework for evaluating progress, changes and trends in forest condition and management at the national and the forest management unit levels. Besides, national policies directly shape the framework for management at the forest management unit level. In fact, guidelines for decision making at the political level can only be established on the basis of best management practices derived from specific ecological and management constraints at the resource level. Equally important is organisational development to harmonise the decision making process which is frequently constrained by institutional fragmentation.

Baseline information

The first time the information is compiled by any country or for any forest management unit, it should form the baseline against which all later compilations may be assessed. This first compilation should, therefore, be supported by as much relevant documentation as possible, such as copies of laws, regulations and maps, in order to provide as complete a picture as possible of the baseline situation. Later compilations need only indicate changes.

Completeness

Every effort should be made to complete all the tables and answer all the questions. This may be difficult at first and some answers may be approximate or the necessary information may not be available; but this, in itself, may indicate where there are deficiencies in the information needed to establish best practices in forest management. It should become progressively easier to complete later compilations.

Comparability of data

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 reliability. Information should, therefore, be provided on the sources and quality of the data presented.

Additional information

Those who compile the information are encouraged to add any additional information which they feel would give a more complete picture of the situation. They should also feel free to indicate any difficulties encountered in providing information or ways in which the Manual might be improved.

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 and 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.

Encroachment

The act or action of using forest land contrary to the provisions provided for in forestry laws and regulations with regard to forest land uses.

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.

Natural Forest[+]

Forest land composed of indigenous trees, not planted by man, which is further classified using the criteria of forest formation (or type), degree of human disturbance or modification, and human interference.

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.

Plantation Forest[+]

Forest stands established by planting or/and seeding in the process of afforestation or reforestation which are either of introduced species (all planted stands) or intensively managed stands of indigenous species, which meet all the following criteria: one or two species, even aged, regular spacing.

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.

* Reproduced from the ITTO publication *Criteria and Indicators for Sustainable Management of Natural Tropical Forests.*

\+ Based on the FRA 2000 Terms and Definitions. Forest Resources Assessment Programme, Working Paper 1, FAO, Rome, 18 November, 1988.

PART A: INDICATORS AT NATIONAL LEVEL

Note

Reports prepared using this Manual should be preceded by a cover page giving:

(a) the name of the Country;
(b) the period covered by the Report;
(c) the institution/agency responsible for completing the Report; and
(d) the date.

Criterion 1: Enabling Conditions for Sustainable Forest Management

This criterion addresses the general institutional requirements that are necessary to make sustainable forest management possible. Most of them cover the legal and institutional frameworks and are mainly descriptive in nature. Taken together, the information gathered indicates the extent of a country's political commitment to sustainable forest management.

Policy and Legal Framework

To ensure sustainable forest management, it is important that the forest resources, especially the permanent forest estate, are secured and protected from encroachment and that they are managed in accordance with best management practices involving the participation of local communities who are dependent on the forest.

Indicator 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.

Action To Be Taken

(i) Record in Table 1.1 the presence (+) or absence (-) of laws, policies and regulations which govern each of the elements (a) to (h) above.
(ii) Describe the relevant sections of these laws, policies and regulations; name the department/authority responsible for each, and the date at which it came into force. If different instruments apply to different categories of land (e.g. private or community forest), explain the differences.
(iii) Provide texts of these laws, policies and regulations.
(iv) Indicate whether there has been significant change during the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(v) If there are significant gaps in the coverage of laws, policies and regulations as shown in Table 1.1, indicate how these gaps will be filled and, if necessary, formulate relevant laws, policies and regulations that will govern each of the items (a) to (h) in the overall context of sustainable forest management.

Table 1.1: Existence of Laws, Policies and Regulations

Framework governing:	Laws	Policies	Regulations
National objectives for forest including production, conservation and protection			
Establishment and security of the permanent forest estate			
Land tenure and property rights relating to forests			
Control of forest management			
Control of forest harvesting			
Control of encroachment			
Health and safety of forest workers			
Participation of local communities			

Economic Framework

One of the most important requirements, if not the most important, for sustainable forest management to succeed is the availability of financial resources, as well as the provision of incentives and appropriate economic instruments that promote and support sustainable forest management.

Indicator 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.

Action To Be Taken

(i) Collect information on the total amount of investment and reinvestment in forest management, administration, research and human resource development, and compute the annual investment and reinvestment for the reporting period. Distinguish between reinvestment from outside sources and reinvestment of income derived from forest use.
(ii) Complete the information as required in Table 1.2.
(iii) Provide the sources from which the information was obtained.

Table 1.2: Amount of Direct Investment and Reinvestment

Sources	Investment (1000 US$)*	Reinvestment (1000 US$)*
Direct national (governmental)		N/A
National (governmental) from forest income	N/A	
Direct sub-national (governmental)		N/A
Sub-national (governmental) from forest income	N/A	
Direct private (domestic)		N/A
Private (domestic) from forest income	N/A	
Bali Partnership Fund		N/A
International (governmental)		N/A
Private (foreign)		N/A
Others (please specify)		
Total		

* Quote exchange rate applied.
N/A Not applicable.

Indicator 1.3

Existence of economic instruments and other incentives to encourage sustainable forest management.

Action To Be Taken

(i) Are economic instruments and other incentives available to encourage sustainable forest management? **[YES/NO]**
(ii) If the answer is **YES**:
  (a) list and give a description of each of the economic instruments and incentives used to encourage sustainable forest management, how they are used, the main institutions responsible and when they were first enforced; and
  (b) indicate whether there has been significant change during the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(iii) If the answer is **NO**, indicate what action will be taken, if any, to develop economic instruments and to provide the necessary incentives to encourage sustainable forest management; and indicate if there are any constraints in doing so.

Institutional Framework

Besides the availability of financial resources, there must be adequate institutions and personnel to undertake sustainable forest management practices. These include research institutions, implementing agencies and appropriately trained personnel to ensure that management practices applied are in accordance with the latest scientific and technical know-how and knowledge. This is pertinent as sustainable management of forest requires a multi-disciplinary approach so as to ensure the continuous production of forest goods and services while minimising adverse impact on the environment and the loss of biological diversity.

Indicator 1.4

Number and adequacy of institutions to support sustainable forest management.

Action To Be Taken

(i) Identify the institutions involved in supporting sustainable forest management.
(ii) Assemble information about these institutions and the main role they play in supporting sustainable forest management.
(iii) Complete the information as required in Table 1.4.
(iv) Assess the adequacy of the institutions that support sustainable forest management.
(v) Provide references for the source and date of the data used. These should be the most recent available for the reporting period.

Table 1.4: Institutions Supporting Sustainable Forest Management

Number	Name of Institution	Type of Institution	Main Role of the Institution
1			
2			
3			
4			
5			
:			
:			
n			

Indicator 1.5

Number and adequacy of trained professional and technical personnel at all levels to perform and support management, implementation, research and extension.

Action To Be Taken

(i) Identify the personnel that perform and support management, implementation, research and extension.
(ii) Classify the personnel according to categories and the role they play in management and development, protection and conservation, research and extension.
(iii) Complete the information as required in Table 1.5.
(iv) Assess the adequacy of trained personnel at all levels to perform and support management, implementation, research and extension.
(v) Provide references for the source and date of the data used. These should be the most recent available for the reporting period.

Table 1.5: Personnel Involved in Forest Management

Category of Personnel	Number of Personnel		
	Management and Development	Protection and Conservation	Research and Extension
Professional			
Technical			
Others			
Total			

Indicator 1.6

Existence and application of appropriate technology to practise sustainable forest management and the efficient processing and utilisation of forest produce.

Action To Be Taken

(i) Is there appropriate technology to practise sustainable forest management and the efficient processing and utilisation of forest produce? **[YES/NO]**
(ii) If the answer is **YES**:
  (a) describe the technology, especially forest engineering and harvesting technology, used to enhance sustainable forest management, as well as the technology used to optimise the processing and utilisation of forest produce and, in particular, the primary wood-based processing industries; and
  (b) indicate whether there has been significant change during the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(iii) If the answer is **NO**, indicate the types of technology, if any, that will be used to enhance sustainable forest management and the processing and utilisation of forest produce; and indicate whether there are any constraints in obtaining them.
(iv) Is appropriate technology being applied to practise sustainable forest management and to process and utilise forest produce efficiently? **[YES/NO]**
(v) If the answer is **YES**, give a brief description of its application.
(vi) Indicate whether there has been significant change during the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(vii) If the answer is **NO**, give details of any action planned and identify any significant constraints in applying it.

Indicator 1.7

Capacity and mechanisms for planning sustainable forest management and for periodical monitoring, evaluation and feed-back on progress.

Action To Be Taken

(i) Are there adequate capacity and mechanisms for planning sustainable forest management and for periodical monitoring, evaluation and feed-back on progress? **[YES/NO]**

(ii) If the answer is **YES**:
   (a) describe the capacity available and mechanisms used for planning sustainable forest management and for the periodical monitoring, evaluation and feed-back on progress;
   (b) describe the institutions responsible for carrying out these tasks; include a flow-chart of the planning process;
   (c) assess whether this capacity is adequate and the mechanisms are effective in undertaking these tasks; and
   (d) describe how far the mechanisms have been implemented and when they were first implemented.

(iii) If the answer is **NO**, indicate the mechanisms, if any, that will be used for planning sustainable forest management and for periodical monitoring, evaluation and feed-back on progress, as well as the capacity to undertake the tasks. Identify any constraints in taking this action.

Indicator 1.8

Degree of public participation in forest management, such as in planning, decision making, data collection, monitoring and assessment.

Action To Be Taken

(i) Does the public participate in aspects of forest management, such as in planning, decision making, data collection, monitoring and assessment? **[YES/NO]**

(ii) If the answer is **YES**:
   (a) list and describe the fora, processes and mechanisms used to enable the public to participate effectively in forest management. This description should include: current legislation and administrative procedures; an enumeration of the parties consulted (individuals, communities, organisations etc.) and an assessment of how well they represent the sectors of society most interested; as well as the degree and level of their participation; and
   (b) describe the institutions responsible for these processes and mechanisms.

(iii) If the answer is **NO**, indicate the processes and mechanisms, if any, that will be used to enable the active participation of the public in forest management and, if necessary, develop appropriate mechanisms to enable the effective participation of interested parties, individuals, communities, organisations etc. Identify any constraints in taking this action.

Indicator 1.9

Adequacy and timeliness of information to increase public awareness about forest policies, legislation and sustainable forest management practices.

Action To Be Taken

(i) Is the information to increase public awareness about forest policies, legislation and sustainable forest management practices adequate, timely and well targeted? **[YES/NO]**

(ii) If the answer is **YES**:
   (a) list all the means by which information is provided to various sectors of the public (including electronic communication) and indicate when they were first made available;
   (b) describe the type and frequency of information made available; indicate the target groups to which this information is addressed and assess the adequacy and timeliness of information in relation to the wishes of these target groups; and
   (c) describe the institutions responsible for these tasks.

(iii) If the answer is **NO**, indicate the most likely course of action that will be taken to increase public awareness about forest policies, legislation and sustainable forest management practices. Identify any constraints in taking this action.

Criterion 2: Forest Resource Security

Sustainable forest management is a long-term enterprise and depends critically upon the stability and security of a nation's forest estate. Hence, this criterion lays the basic foundation for sustainable forest practices. It considers comprehensively the extent and percentage of land under natural and plantation forests, the needs for the conservation of biological diversity and the aspirations of present and future generations in relation to forest goods and services in the overall context of national economic planning, as well as in the quest to achieve sustainable development.

Description of Resource Base

An overall land-use plan is important to ensure sustainable forest management, especially of the permanent forest estate, in relation to the other sectors of the economy. In this context, the external boundaries of the permanent forest estate should be clearly demarcated and changes in their extent should be regularly monitored.

Indicator 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.

Action To Be Taken

(i) Prepare land-use maps, at appropriate scale, depicting natural forest, plantation forest, permanent forest estate and land under comprehensive integrated land-use plans.
(ii) Determine the extent (area) of each land-use class.
(iii) Complete the information as required in Table 2.1.
(iv) Indicate the sources of such data and the means by which they were obtained, for example, from remotely-sensed data etc.

Table 2.1: Extent and Percentage of Land-use Classes

Land Use Classes*	Area (1000 ha)	Percent of Total Land Area+ (%)
Land under integrated land-use plans		
Permanent forest estate (PFE)		
Natural forest within PFE		
Natural forest outside PFE		
Plantation forests within PFE		
Plantation forests outside PFE		

* Note that these classes are not mutually exclusive and may overlap. See also Table 2.4.
\+ Refers to total land area of a country, excluding inland waterbodies.

Indicator 2.2

Extent (area) and percentage of total land area under each forest type.

Action To Be Taken

(i) Give a brief description of each of the principal forest types in the country (see definition of 'forest type'). Each country should use the classification of forest types available to it which is most suitable for giving details of their species composition and providing 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).

(ii) Complete Table 2.2a using this information.
(iii) Demarcate each forest type on maps depicting natural forests.
(iv) Determine the extent (area) of each forest type.
(v) Complete the information as required in Table 2.2b.
(vi) Provide references for the source and date of the data used. These should be the most recent available for the reporting period.

Table 2.2a: Forest Types

Number	Name of Forest Type	Description
1		
2		
:		
:		
n		

Table 2.2b: Extent and Percentage of Forest Types

Forest Type	Area (1000 ha)	Percent of Total Land Area ‡(%)
Type 1		
Type 2		
Type 3		
:		
:		
Type n		

‡ Refers to total land area of a country, excluding inland waterbodies.

Indicator 2.3

Length and percentage of external boundaries of the permanent forest estate demarcated or clearly defined.

Action To Be Taken

(i) Determine the extent and percentage of external boundaries demarcated or clearly defined through such means as under-brushing, marking of selected trees located along the boundaries and the fixing of signboards.
(ii) Complete the information required in Table 2.3.
(iii) Provide references for the source and date of the data used. The sources may be field data, maps, records etc. These should be the most recent available for the reporting period.
(iv) Indicate the institutions responsible for this task.
(v) If the boundaries have not been demarcated or clearly defined, describe plans, if any, for completing this task. Identify any constraints in taking this action.

Table 2.3: External Boundaries of Permanent Forest Estate

Total External Boundaries of Permanent Forest Estate			
Length Demarcated (100 km)	Length Not-Demarcated (100 km)	Percent Demarcated (%)	Percent Not-Demarcated (%)

Indicator 2.4

Area of the permanent forest estate converted to permanent non-forest use.

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 by major use classes can be recorded.

Action To Be Taken

(i) Identify those areas formally converted to permanent non-forest use, such as for agriculture, settlements and infrastructural development etc., since the last reporting.
(ii) Determine the extent (area) formally converted to permanent non-forest use.
(iii) Identify areas formally added to the permanent forest estate since the last reporting.
(iv) Determine the extent (area) formally added to the permanent forest estate.
(v) Complete the information as required in Table 2.4.
(vi) Indicate the sources of such data and the means by which they were obtained, for example, from remotely-sensed data, maps and records etc. This should be the most recent available for the reporting period.

Table 2.4: Conversion of Permanent Forest Estate

Changes in Area of Permanent Forest Estate	Area (1000ha)
Area at last reporting	
Area formally converted to agriculture	
Area formally converted for settlements and infrastructural development	
Area formally converted for other purposes (please specify)	
Area formally added since the last reporting	
Present area of the PFE	

Protection Procedures

The forest resource base should be secured not only through legislative means but also through the control of harmful anthropogenic activities. This will ensure that investment in long-term sustainable forest management will not be wasted and that it will continue to yield the desired forest goods and services.

Indicator 2.5

Existence of procedures to control encroachment, fire, grazing and illegal exploitation of forests.

Action To Be Taken

(i) Are there procedures that are being effectively applied to control encroachment, fire, grazing and illegal exploitation of forests? **[YES/NO]** (see also Indicator 3.5).
(ii) If the answer is **YES**:
  (a) list and describe the procedures used to control encroachment, fire, grazing and the illegal exploitation of forests. This description should include details of any relevant legislation or means to control these activities with the dates at which they came into effect;
  (b) indicate the institutions responsible for these tasks; and
  (c) indicate whether there has been significant change during the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(iii) If the answer is **NO**, indicate whether action, if any, will be taken to formulate procedures to control encroachment, fire, grazing and illegal exploitation of forests, as well as to provide the necessary legislative means to control such activities. Identify any constraints in taking this action.

Criterion 3: Forest Ecosystem Health and Condition

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

Area of Forest Damaged by Human Activities and Degree of Damage

There are many human activities which may affect the health or damage the condition of forests in the tropics. Not all of them occur in all countries. Each may vary in severity from year to year. This indicator is designed so that:

(a) countries can choose those activities which are relevant to them; and
(b) the data will form a time series and thus reveal trends.

Indicator 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).

Action To Be Taken

(i) Identify the main types of human disturbance affecting the country's forests in the year of reporting. If any is not applicable, enter 'N/A'.
(ii) For each type of disturbance, assess the extent (area) of the damage caused in the year of reporting.
(iii) Assess the severity of damage on a three-point scale (light, medium, heavy).
(iv) Complete Table 3.1 to show damage in the year of reporting.

Table 3.1: Damage by Human Activity in the Year of Reporting

Type of Human Activity*		Area Affected and Intensity of Damage (ha)		
		Light	Medium	Heavy
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 (re-entry)			
l	Hunting			
m	Other forms of forest damage (please specify)			

* If data are to be comparable between reporting periods, it is important to document carefully:
(a) the way in which each of these kinds of damage is defined (e.g. 'roads' might be taken to cover only the surface area of the road, the area affected by drainage from the road or the area influenced by migrants settled along the road); and
(b) the interpretation the assessor places on 'light', 'medium' and 'heavy'.

Area and Degree of Forest Damage by Natural Causes

In addition to the damage caused by human activities, the forest may be damaged by natural agents. Such damage should be taken into account in determining the net production area for forest goods and services.

Indicator 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.

Action To Be Taken

(i) Identify the main types of natural disturbance as in items (a) to (e) above affecting the country's forests.
(ii) For each type, assess the extent (area) of the damage caused.
(iii) Assess the severity of damage on a three-point scale (light, medium, heavy).
(iv) Complete Table 3.2 to show damage in the year of reporting.

Table 3.2: Forest Damage from Natural Causes in the Year of Reporting

Type of Natural Damage*		Area Affected and Intensity of Damage (ha)		
		Light	Medium	Heavy
a	Wild fire			
b	Drought			
c	Storms and natural catastrophes			
d	Pests and diseases			
e	Other natural causes (please specify)			

* If the data are to be comparable between reporting periods, it is important to document carefully the interpretation the assessor places on 'light', 'medium' and 'heavy'.

Conservation and Protection Procedures

A number of additional measures can be taken to reduce or eliminate damage from both natural and human agents. The following indicators deal with some of these.

Indicator 3.3

Existence and implementation of quarantine and phytosanitary procedures to prevent the introduction of pests and diseases.

Action To Be Taken

(i) Are there quarantine and phytosanitary procedures to prevent the introduction of pests and diseases? **[YES/NO]**
(ii) If the answer is **YES**:
  (a) list and describe the most recent procedures available for the reporting period and assess their adequacy;
  (b) name the institutions responsible; and
  (c) indicate whether there has been any change over the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(iii) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.
(iv) Are these measures being implemented? **[YES/NO]**
(v) If the answer is **YES**, give a brief description of the measures. Indicate whether there has been any change over the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(vi) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.

Indicator 3.4

Existence and implementation of procedures to prevent the introduction of potentially harmful exotic plant and animal species.

Action To Be Taken

(i) Are there procedures to prevent the introduction of potentially harmful exotic plant and animal species? **[YES/NO]**
(ii) If the answer is **YES**:
  (a) list and describe the most recent procedures available for the reporting period and assess their adequacy;
  (b) name the institutions responsible; and
  (c) indicate whether there has been any change over the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(iii) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.
(iv) Are these measures being implemented? **[YES/NO]**

(v) If the answer is **YES**, give a brief description of the measures. Indicate whether there has been any change over the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(vi) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.

Indicator 3.5

Availability and implementation of procedures covering:

(a) use of chemicals in the forest, and
(b) fire management.

Action To Be Taken

(i) Are there procedures covering (a) the use of chemicals in the forest **[YES/NO]**; and (b) fire management? **[YES/NO]**
(ii) If the answer is **YES:**
  (a) list and describe the most recent procedures available for the reporting period and assess their adequacy;
  (b) name the institutions responsible; and
  (c) indicate whether there has been any change over the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(iii) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.
(iv) Are these measures being implemented? **[YES/NO]**
(v) If the answer is **YES**, give a brief description of the measures. Indicate whether there has been any change over the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(vi) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.

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 timber production are able to fulfil a number of other important forest functions, such as environmental protection and the conservation of species and ecosystems. 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.

Resource Assessment

Forest resource assessments carried out periodically are vital for ensuring the sustainable production of forest goods and services for society. They provide the necessary information not only on the level of yield that may be harvested but also the type and quality of forest produce that may be extracted if the resource is managed effectively and which is compatible with the need to safeguard the forest environment, as well as its genetic resources. In this regard, sampling designs for undertaking forest resource appraisals should be statistically sound and cost-effective, and be appropriate to meet the information required at the various levels of management planning, be it at the national, sub-national or forest management unit levels.

The indicators in this subsection are designed to provide important information on:

(a) the extent or area of all forest land (both permanent forest estate and others) for which survey and inventory procedures have been used to define the main forest products (Table 4.1);
(b) the class or category of owner or right holder for such forest lands, both permanent forest estate and others (Table 4.1);
(c) the level of sustainable harvest from lands managed as permanent forest estate, by main forest product and forest type (Table 4.2); and
(d) the quantity or volume of wood and non-wood forest products being harvested by forest type from both permanent forest estate and other forest lands (Table 4.3).

The land areas shown in Table 4.1 may overlap and columns may not necessarily be additive. The quantity of sustainable harvest shown in Table 4.2 from the permanent forest estate should reflect the overall resource objectives for which the land is being managed. The total harvest volume or quantity shown in Table 4.3 may be greater than the sustainable harvest shown in Table 4.2, if among other things, forest outside the permanent forest estate is being converted to permanent non-forest uses.

Indicator 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.

Action to Be Taken

(i) Identify the forest areas where inventory and surveys have been conducted.
(ii) Determine from existing maps or/and records the extent (area) and percentage of forest inventoried and surveyed in terms of main forest products and resource rights and ownership.[1]
(iii) Complete the information as required in Table 4.1.
(iv) Indicate the sources of such data and the means by which they are obtained. These should be the most recent available for the reporting period.

1 The land ownership classes listed in Table 4.1 are based on FRA 2000 Terms and Definitions. Forest Resources Assessment Programme, Working Paper 1, FAO, Rome, 1998. See Appendix 3.

Table 4.1: Forest Areas Inventoried and Surveyed

Main Forest Product*	Resource Rights and Ownership											
	Public Ownership				Private Ownership						Indigenous or Tribal People	
	State		Other Public Institutions		Individuals		Forest Industries		Other Private Institutions			
	Area (1000 ha)	%	Area (1000 ha)	%	Area (1000 ha)	%	Area (1000 ha)	%	Area (1000 ha)	%	Area (1000 ha)	%
Product 1												
Product 2												
Product 3												
:												
:												
Product n												

* Include wood and non-wood forest products which may be found together in the same forest area; percent (%) refers to the proportion of area inventoried and surveyed over the total forested area.

Indicator 4.2

Estimate of level of sustainable harvest for each main wood and non-wood forest product for each forest type.

Action To Be Taken

(i) Estimate the level of sustainable harvest for each wood and non-wood product for each forest type in the permanent forest estate, building on sustained yield principles in a way that ensures the functioning of the forest ecosystem and incorporates its diverse elements.
(ii) Complete the information as required in Table 4.2.

Table 4.2: Level of Sustainable Harvest by Forest Types

Main Forest Product*	Forest Type						Total
	Type 1	Type 2	Type 3	--- ---	--- ---	Type n	
Product 1							
Product 2							
Product 3							
:							
:							
Product n							

* Include wood and non-wood forest products; these may be found together in a given forest type. Indicate the appropriate units of measurement used.

Indicator 4.3

Quantity (volume) of wood and important non-wood forest products harvested for each forest type.

Action to Be Taken

(i) Are there procedures in place to record and monitor the quantity (volume) of wood and important non-wood forest products harvested for each forest type? **[YES/NO]**
(ii) If the answer is **YES**:

(a) collect information on the quantity (volume) harvested, from records of wood and important non-wood forest products harvested for each forest type during the last five years, and compute the average annual quantity harvested for areas within the permanent forest estate, as well as other forested areas; and

(b) complete Table 4.3 and repeat the table for each forest type identified/classified.

(i) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.

Table 4.3: Quantity of Wood and Non-Wood Forest Products (Forest Type . .)

Main Forest Product*	Average Annual Quantity Harvested+	
	Permanent Forest Estate	Other Forested Areas
Product 1		
Product 2		
Product 3		
:		
:		
Product n		

* Include wood and non-wood forest products.

\+ Indicate the appropriate units of measurement used.

Planning Procedures

Planning procedures have to be sound and effective as the production of forest goods and services generally requires a long gestation period. It is through proper planning that investment in forestry activities will yield the desired returns to society.

Indicator 4.4

Existence and implementation of:

(a) forest management plans, and

(b) forest harvesting (operational) plans.

Action To Be Taken

(i) Are forest management plans and forest harvesting (operational) plans prepared? **[YES/NO]**

(ii) If the answer is **YES**:

(a) list and give a description of the procedures and processes adopted in formulating the forest management plans and the forest harvesting (operational) plans;

(b) provide a listing of and documentation on the management plans and forest harvesting (operational) plans that are being implemented; and

(c) has there been significant change during the last two years or, if this is not the first assessment, since the most recent assessment (give date)? If so, elaborate on the changes.

(iii) If the answer is **NO**, indicate action that will be taken, if any, to formulate the forest management plans and forest harvesting (operational) plans, and when they will be implemented, including constraints that may exist in curtailing their formulation.

(iv) Are the management plans and forest harvesting (operational) plans being implemented? **[YES/NO]**

(v) If the answer is **YES**, give a brief description of the main institutions responsible and the level of implementation, including the identification of constraints that curtail their full implementation.

(vi) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.

Indicator 4.5

Extent and percentage of:

(a) production forest covered by management plans, and
(b) compartment/coupes harvested according to harvesting (operational) plans.

Action To Be Taken

(i) Determine the extent (area) and percentage of production forest for each forest type covered by management plans in the permanent forest estate.
(ii) Complete Table 4.5a using this information.
(iii) Determine the extent (area) and percentage of compartments/coupes harvested according to harvesting/operational plans in the permanent forest estate.
(iv) Complete Table 4.5b using this information.
(v) Provide references as to where the data were obtained which must be the most recent available for the reporting period.

Table 4.5a: Production Forest in the Permanent Forest Estate Covered by Management Plans for each Forest Type

Forest Type	Production Forest		Total (1000 ha)
	Under Management Plans (1000 ha)	Not under Management Plans (1000 ha)	
Type 1			
Type 2			
Type 3			
:			
:			
Type n			

Table 4.5b: Compartments/Coupes in the Permanent Forest Estate Harvested According to Harvesting Plans

Forest Type	Compartments/Coupes Harvested		Total (1000 ha)
	Under Harvesting Plans (1000 ha)	Not under Harvesting Plans (1000 ha)	
Type 1			
Type 2			
Type 3			
:			
:			
Type n			

Indicator 4.6

Existence of long-term projections, strategies and plans for production, including the use of tree plantations.

Action To Be Taken

(i) Are long-term projections, strategies and plans for production from natural forests and tree plantations available? **[YES/NO]**

(ii) If the answer is **YES**, elaborate the strategies, plans and procedures adopted for projecting the production of wood and non-wood forest products, including those from tree plantations and indicate the main institutions responsible. Has there been significant change during the last two years or since the most recent assessment (give date)? If so, elaborate on the changes.

(iii) Compute a 10-year average annual production forecast and use this figure to complete Table 4.6 for the year of reporting and at ten-yearly intervals for the next four decades for each forest type. Include tree plantations and repeat the table for each forest type identified/classified.

(iv) If the answer is **NO**, indicate action taken, if any, to formulate strategies and plans to forecast current and future yields of wood and non-wood forest products from natural forests for each forest type identified/classified, as well as from tree plantations. Assess the likelihood that this information will be made available, and identify any constraints that may hinder the formulation of strategies or plans and the forecasting of yield.

(v) Provide the sources of the data used to complete Table 4.6.

Table 4.6: Forecast of Production of Wood and Non-Wood Forest Products (Forest Type . . . . .)

Main Forest Product[+]	Yield Forecasts (Forest Type . . . . .) (Average Annual Production for the Decade)				
	y* to y+10	y+11 to y+20	y+21 to y+30	y +31 to y+40	y+41 to y+50
Product 1					
Product 2					
Product 3					
:					
:					
Product n					

[+] Include wood and non-wood forest products and indicate the appropriate units of measurement used.

* y = year of reporting.

Indicator 4.7

Availability of historical records on the extent, nature and management of forest.

Action To Be Taken

(i) Are historical records on the extent, nature and management of forest available? **[YES/NO]**

(ii) If the answer is **YES**, list and give a description of the extent, nature and the effectiveness of using historical records in managing the forests, especially the permanent forest estate, as well as highlight their deficiencies in enhancing sustainable forest management practices.

(iii) If the answer is **NO**, describe the steps that will be taken, if any, to make available historical records that are useful to enhance sustainable forest management and when they are likely to be used for such purposes.

Management Guidelines

Clear management guidelines on forest operations, such as pre-felling forest inventory for prescribing sustainable cutting levels, post-felling forest inventory for assessing the status and condition of logged-over forests and the types of silvicultural treatments needed to rehabilitate such forests, procedures on forest harvesting to reduce damage to the forest ecosystem and its environment, and procedures for periodic monitoring and evaluation of management practices, will ensure that all forestry operations are carried out in the most cost-effective manner. This will also facilitate better communication between planners and field operators in undertaking forestry activities in the overall context of sustainable forest management.

Indicator 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.

Action To Be Taken

(i) Are management guidelines available to cover the assessment of natural regeneration and measures to supplement the natural regeneration, if required, for each of the main wood and non-wood forest products to be harvested? **[YES/NO]**
(ii) If the answer is **YES**:
  (a) list and give a description of the management guidelines used to assess the natural regeneration for each of the main wood and non-wood forest products to be harvested and measures taken to supplement natural regeneration, if required, and when they were first implemented, including the main institutions responsible; and
  (b) indicate whether there has been significant change during the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(iii) If the answer is **NO**, indicate action that will be taken, if any, to develop management guidelines for each of the main wood and non-wood forest products and when they will be implemented, including constraints that may curtail their implementation and whether it is envisaged that measures will be taken to supplement natural regeneration, if they are deemed necessary.
(iv) Are the management guidelines on assessment of natural regeneration and measures to supplement natural regeneration, if required, for each of the main wood and non-wood forest products to be harvested being effectively implemented? **[YES/NO]**
(v) If the answer is **YES**, give a brief description on the level of their implementation, including the identification of constraints that impede their full implementation.
(vi) If the answer is **NO**, give details of any action planned including constraints that may curtail this action.

Indicator 4.9

Availability and implementation of procedures to monitor and review the management guidelines.

Action To Be Taken

(i) Are procedures to monitor and review the management guidelines available? **[YES/NO]**
(ii) If the answer is **YES**:
  (a) list and give a description of the procedures developed to monitor and review the management guidelines for each of the main wood and non-wood forest products and the frequency of such monitoring and reviews, including the main institutions responsible; and
  (b) indicate whether there has there been significant change during the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(iii) If the answer is **NO**, indicate whether procedures will be developed to monitor and review management guidelines, and when they will be made available for use. Indicate any constraints that may exist.
(iv) Are the procedures to monitor and review management guidelines being effectively implemented? **[YES/NO]**
(v) If the answer is **YES**, assess the extent to which procedures to monitor and review management guidelines are being implemented.
(vi) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.

Indicator 4.10

Availability and implementation of guidelines for reduced/low impact logging to minimise damage to residual stand.

Action To Be Taken

(i) Are guidelines for reduced/low impact logging to minimise damage to residual stands available? **[YES/NO]**
(ii) If the answer is **YES**:
  (a) list and give a description of the guidelines used for reduced/low impact logging that minimise damage to residual stands, including the main institutions responsible; and
  (b) indicate whether there has there been significant change during the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(iii) If the answer is **NO**, indicate whether action will be taken to develop guidelines for reduced/low impact logging to minimise damage to residual stands and indicate when they will be implemented. Identify any constraints in taking this action.
(iv) Are the guidelines for reduced/low impact logging to minimise damage to residual stands being effectively implemented? **[YES/NO]**
(v) If the answer is **YES**, assess the extent to which the guidelines for reduced/low impact logging to minimise damage to residual stands are being implemented.
(vi) If the answer is **NO**, give details of any action planned and identify any constraints in taking this action.

Monitoring and Evaluation

It is pertinent to evaluate how fully and effectively any available management guidelines are implemented for the main wood and non-wood forest products in the permanent forest estate. This is because the guidelines may need to be revised and updated to reflect new concepts of sustainable forest management. The level of damage to the residual stand after logging, as well as the adequacy of regeneration should also be monitored, so as to ensure the sustainable production of the main wood and non-wood forest products.

Indicator 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.

Action To Be Taken

(i) Are procedures available for each of the items (a) to (c) above? **[YES/NO]**
(ii) If the answer is **YES**:
  (a) list and give a description of the procedures used for the comprehensive evaluation of the implementation of management guidelines and in assessing logging damage to the residual stands, as well as procedures for post-harvest surveys to assess the effectiveness of regeneration of the main wood and non-wood forest products, including the main institutions responsible; and
  (b) indicate whether there has been significant change during the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(iii) If the answer is **NO**, indicate whether procedures will be developed for the comprehensive evaluation of the implementation of management guidelines and for assessing logging damage to residual stands, as well as post-harvest surveys to assess the effectiveness of regeneration of the main wood and non-wood forest products, and when they will be implemented. Identify any constraints in taking this action.
(iv) Are the procedures for each of the items (a) to (c) above being effectively implemented? **[YES/NO]**
(v) If the answer is **YES**, assess the extent of their implementation for each of the procedures (a) to (c).

(vi) If the answer is **NO**, give details of any action planned including any constraints that may curtail their full implementation.

Indicator 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.

Action To Be Taken

(i) Identify the areas in the permanent forest estate that have been harvested.
(ii) Determine the extent of the harvested forests in the permanent forest estate that have followed the management guidelines completely for each of the main wood and non-wood forest products.
(iii) Complete the information as required in Table 4.12a.
(iv) Determine the extent of harvested forests in the permanent forest estate where post-harvest surveys have been conducted to assess the effectiveness of regeneration for the main wood and non-wood forest products.
(v) Complete the information as required in Table 4.12b.

Table 4.12a: Extent and Percentage of Harvested Forest Areas Under Management Guidelines

Main Forest Product*	Forest Areas Harvested				Total Forest Areas Harvested
	Under Management Guidelines		Not Under Management Guidelines		
	Area (1000 ha)	Percent+ (%)	Area (1000 ha)	Percent (%)	(1000 ha)
Product 1					
Product 2					
Product 3					
:					
:					
Product n					

* Include wood and non-wood forest products.
\+ Percent of total forest areas harvested.

Table 4.12b: Extent and Percentage of Harvested Forest Areas where Post-Harvest Surveys have been Conducted

Main Forest Product*	Forest Areas Harvested				Total Forest Areas Harvested
	Post-Harvest Survey Conducted		Post-Harvest Survey Not Conducted		
	Area (1000 ha)	Percent+ (%)	Area (1000 ha)	Percent (%)	(1000 ha)
Product 1					
Product 2					
Product 3					
:					
:					
Product n					

* Include wood and non-wood forest products.
\+ Percent of total forest areas harvested.

Criterion 5: Biological Diversity

This criterion relates to the conservation and maintenance of biological diversity, including ecosystems, species and genetic diversity. The general principles are spelt out in the *ITTO Guidelines on the Conservation of Biological Diversity in Tropical Production Forests* (ITTO Policy Development Series No.5).

Ecosystem Diversity

The conservation of ecosystem diversity at the national level can best be accomplished by the establishment and management of a system of protected areas (combinations of IUCN Categories I to VI)[2] containing representative samples of all forest types in the country. The system should, as far as possible, include samples of forests in their original or near-original condition. Historical records should be used where these exist. The effectiveness of such a system of protected areas depends upon the total area protected, the percentage of each forest type covered, their representativeness, their size relative to the area of forest type, their setting in the landscape (comprising the other ecosystems that surround them), and the existence of biological corridors linking them or 'stepping stones' between them. This can be ensured by effective policies for national land use, forest land use and for protected areas, supported by appropriate legislation, effective mechanisms for implementation and enforcement, and consultation and harmonious relations with local communities.

Indicator 5.1

Statistics of protected areas 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.

Action To Be Taken

Using the classification of forest types set out in Table 2.2a, complete the following two tables of statistics for protected areas in each forest type. Table 5.1a covers Categories I-II corresponding to strict protection; Table 5.1b covers Categories III-VI where protection is combined with management.

Table 5.1a: Protected Areas in IUCN Categories I-II

Protected Areas	Forest Type				
	Type 1	Type 2	Type 3	--- ---	Type n
Number					
Extent (ha)					
Percentage of forest type covered (%)					
Range of sizes of protected area (ha)					
Average size of protected areas (ha)					
Percentage of boundaries demarcated or clearly defined (%)					

[2] See Appendix 1.

Table 5.1b: Protected Areas in IUCN Categories III-VI

Protected Areas	Forest Type				
	Type 1	Type 2	Type 3	- - - - - -	Type n
Number					
Extent (ha)					
Percentage of forest type covered (%)					
Range of sizes of protected area (ha)					
Average size of protected areas (ha)					
Percentage of boundaries demarcated or clearly defined (%)					

Indicator 5.2

Percentage of total number of protected areas connected by biological corridors or 'stepping stones' between them.

Action To Be Taken

(i) Determine the percentage of the total number of protected areas (Categories I-VI) which are connected by continuous forest areas (biological corridors) or by scattered patches of forest sufficiently closely spaced to allow for some movement of animals and dispersal of plants between them.

(ii) Determine the percentage of the total number of protected areas (Categories I-VI) which are surrounded by areas which are no longer forest.

(iii) Complete the information as required in Table 5.2.

Table 5.2: Connectivity of Protected Areas

Total Number of Protected Areas	Connected by Forest Areas		Not Connected by Forest Areas	
	Number	Percent of Total * (%)	Number	Percent of Total *(%)

* Percent of total protected areas of IUCN Categories I-IV.

Species Diversity

Although the conservation of biological diversity is best assured by preventing species from becoming rare, threatened or endangered in the first place, it is also important to have national procedures effectively to monitor and protect such species.

Indicator 5.3

Existence and implementation of procedures to identify endangered, rare and threatened species of forest flora and fauna.

Action To Be Taken

(i) Are there procedures to list endangered, rare and threatened species of forest flora and fauna? The IUCN Endangerment Status Categories should be used [3]. **[YES/NO]**

[3] For many years the extent to which species were endangered were described by the three categories 'endangered', 'rare' and 'threatened'. These are the terms used in Indicator 5.3. Since 1994, however, a new and more exact series of categories has been adopted by IUCN. These are reproduced in Appendix 2. Countries should, as far as possible, use the new categories; but, if any country has not yet adopted the new categories, they should use the pre-1994 Categories instead. Where the word 'endangered' is used in the text of these Criteria and Indicators, this should be taken to include the three new categories 'Critically Endangered' (CR), 'Endangered' (EN) and 'Vulnerable' (VU).

(ii) If the answer is **YES**:
   (a) list and describe the most recent procedures available for the reporting period and assess their adequacy;
   (b) name the institutions responsible; and
   (c) indicate whether there has been any change over the last two years or since the most recent assessment (give date). If so, elaborate on the changes.

(iii) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.

(iv) Are these measures being implemented? **[YES/NO]**

(v) If the answer is **YES**, give a brief description of the measures. Indicate whether there has been any change over the last two years or since the most recent assessment (give date). If so, elaborate on the changes.

(vi) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.

Indicator 5.4

Number of endangered, rare and threatened forest-dependent species.

This indicator is designed to provide an assessment of the extent to which forest-dependent species are threatened and how this is changing with time. The more complete the information, the better the assessment.

Action To Be Taken

Table 5.4 should be filled in where information is available. Exact numbers should be given where known; if no information is available, enter 'not known'. If it is not possible to break down the information according to groups of plants and animals, a single overall figure may be inserted. If, on the other hand, there is detailed information about any other special group (e.g. fish, reptiles, beetles), this should be added to the table.

Table 5.4: 'Endangered' Forest-Dependant Species

Forest-Dependant Species	Total Species (no.)	*Of which:* Endangered (no.)
Trees		
Other flowering plants		
Ferns		
Mammals		
Birds		
Reptiles		
Amphibians		
Fresh-water fish		
Butterflies		
Others (please specify)		

Indicator 5.5

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

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

Action To Be Taken

(i) Choose 10 to 20 endangered, rare and threatened species for which good information is available nationally about past and present range. These should, as far as possible, be chosen to represent each of the well-documented groups of plants and animals (for example, tree species, conspicuous flowering plants, ferns, mammals, birds, reptiles, amphibians, fresh-water fish, butterflies).
(ii) Complete Table 5.5 for the chosen species.
(iii) Add maps of original and present distributions, if available.

Table 5.5: Range of 'Endangered' Species

Name of Species	Present Range (km^2)	Percentage of Original Range now Occupied	Forest Type(s) with which Associated
1			
2			
3			
n			

Genetic Diversity

The complete conservation of biological diversity requires the maintenance of the genetic diversity of all species. Although this may be difficult to achieve in practice, an appropriate place to focus limited resources is on species that are rare, threatened or endangered, as well as species with identified commercial value.

Indicator 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.

Action To Be Taken

(i) Is there a national strategy for *in situ* conservation of the genetic variation within commercial, endangered, rare and threatened species of forest flora and fauna? **[YES/NO]**
(ii) If the answer is **YES**, give details of the species concerned and the action being taken; and name the responsible authority.
(iii) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.
(iv) Is there a national strategy for *ex situ* conservation of the genetic variation within commercial, endangered, rare and threatened species of forest flora and fauna? **[YES/NO]**
(v) If the answer is **YES**, give details of the species concerned and action being taken; and name the responsible authority.
(vi) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.

Management Guidelines

An additional important contribution to the national conservation of biological diversity can be made by some management measures in production forests. These will (a) contribute to forest quality (see Criterion 3 - Forest Ecosystem Health and Condition), (b) contribute directly to biological diversity, and (c) enable neighbouring protected areas to be more effective by providing them with more compatible surroundings. Such conservation is ensured by management guidelines for the forests in question. Detailed guidelines are given in Recommended Actions 8-17 of the ITTO Policy Development Series No.5 *(ITTO Guidelines on the Conservation of Biological Diversity in Tropical Production Forests)*.

Indicator 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.

Action To Be Taken

(i) Are there national guidelines to keep undisturbed representative or special parts of each production forest? **[YES/NO]**
(ii) If the answer is **YES**:
  (a) in what percentage of production forests are these guidelines applied?
  (b) what percentage of national production forests are protected in this way?
  (c) what institutions are responsible?
(iii) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.
(iv) Are there national guidelines to protect endangered, rare and threatened species of forest flora and fauna within production forests? **[YES/NO]**
(v) If the answer is **YES**:
  (a) which species are covered by these guidelines?
  (b) in what percentage of national production forest are these guidelines implemented?
  (c) what institutions are responsible?
(vi) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.
(vii) Are there national guidelines to protect features of special biological interest within production forests? (This is designed to protect items such as seed trees, nesting sites, niches and keystone species). **[YES/NO]**
(viii) If the answer is **YES**:
  (a) which special features are covered by these guidelines?
  (b) in what percentage of national production forest are these guidelines implemented?
  (c) which institutions are responsible?
(ix) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.

Monitoring and Evaluation Procedures

Indicator 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.

This depends:

(a) upon the protection of representative areas of each forest type so that they may be used as controls against which changes in production forests may be assessed; and
(b) upon the operation of a monitoring system.

Action To Be Taken

(i) Are there national procedures for the protection of representative areas of each forest type? **[YES/NO]**
(ii) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.
(iii) If the answer is **YES**, are there procedures for the periodic monitoring of chosen parameters of biological diversity in both areas of production forest and comparable areas of protected forest? **[YES/NO]**
(iv) If the answer is **YES**, elaborate on these procedures, the institutions responsible and are they being implemented?
(v) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.

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 soil and water within the forest and its 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.

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

The protection of soil and water is therefore best ensured by specific guidelines for different situations; and these can only be based on experience and research. The qualitative Indicators 6.6 to 6.8 deal with the availability and implementation of such guidelines and procedures.

Indicators 6.1-6.5, being quantitative 'outcome' indicators, can be considered a measure of the extent to which the guidelines and procedures are applied.

Valid national indicators can only be derived from the aggregation of data from indicators at the forest management unit level, or from the fact that adequate national guidelines exist and are properly enforced in conformity with the variation in local conditions.

Extent of Protection

Indicator 6.1

Extent and percentage of total forest area managed primarily for the protection of soil and water.

Action To Be Taken

Complete Table 6.1 from national forest statistics.

Table 6.1: Forest Area Managed Primarily for the Protection of Soil and Water

Forest	Area (ha)	Percent Area (%)
Total forest area		100
Forest area managed primarily for protection of soil and water		

Indicator 6.2

Extent and percentage of area to be harvested for which off-site catchment values have been defined, documented and protected before harvesting.

Action To Be Taken

(i) A number of steps need to be taken to assemble the relevant data:
   (a) map the catchment area downstream of each forest management unit to be harvested in order to define and document which features require special protection; and
   (b) identify the measures needed to provide this protection. These may be modifications of harvesting practices in the upstream forests or special on-site protective measures such as retaining dams or bunds.

(ii) Aggregate the information from (i) to complete Table 6.2.

Table 6.2: Protection of Downstream Catchment Values

Forest	Area (ha)	Percent Area (%)
Total forest area to be harvested		100
Forest area for which downstream catchment values have been defined and documented before harvesting		
Forest area for which downstream catchment values have been protected before harvesting		

Indicator 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.

There are normally national guidelines for the protection of environmentally sensitive areas (see Indicators 6.6, 6.7 and 6.8). Many countries have developed soil classifications for their forest areas which identify the erodibility of particular soils as a function of soil type, slope and rainfall intensity or similar parameters. Information for this indicator should be derived from national guidelines and the nationally accepted classification of soil erodibility.

Action To Be Taken

(i) Map all forest management units for soil erodibility using data on geology, soil, rainfall and slope.
(ii) Determine whether erodible soils have been adequately protected before harvesting.
(iii) Details should be given of the soil classification used and of the procedures followed in reaching these figures.
(iv) Aggregate the information from (i) to complete Table 6.3.

Table 6.3: Environmentally Sensitive Areas in Forest Areas to be Harvested

Forest	Area (ha)	Percent Area (%)
Total forest area to be harvested		100
Area to be harvested which has been defined as environmentally sensitive (e.g. very steep or erodible) and protected before harvesting		

Indicator 6.4

Extent and percentage of area to be harvested for which drainage systems have been demarcated or clearly defined and protected before harvesting.

Action To Be Taken

(i) Map all drainage systems that need protection within each forest management unit.
(ii) Determine whether these drainage systems have been adequately protected before harvesting.
(iii) Aggregate the information from (i) to complete Table 6.4.

Table 6.4: Protection of Drainage Systems in Forest Areas to be Harvested

Forest	Area (ha)	Percent Area (%)
Total forest area to be harvested		100
Area to be harvested for which drainage systems have been demarcated or clearly defined before harvesting		
Area to be harvested for which drainage systems have been protected before harvesting		

Indicator 6.5

Percentage of length of edges of watercourses, waterbodies, mangroves and other wetlands protected by adequate buffer strips.

Action To Be Taken

(i) Map all buffer strips within each forest management unit.
(ii) Calculate the length and percentage of the edges which have been designated as buffer strips, and which are adequately protected.
(iii) Aggregate this information to complete Table 6.5.

Table 6.5: Buffer Strips

Edges Protected	Buffer Strips	
	Length (100 km)	Percent (%)*
Watercourses		
Waterbodies		
Mangroves		
Other wetlands		
Total		

* Percent of total length of edges of watercourses, waterbodies, mangroves and other wetlands.

Conservation and Protection Procedures

Indicator 6.6

Existence and implementation of procedures to identify and demarcate sensitive areas for the protection of soil and water.

Action To Be Taken

(i) Are there procedures to identify and demarcate sensitive areas for the protection of soils and water? **[YES/NO]**
(ii) If the answer is **YES**:
  (a) list and describe the most recent procedures available for the reporting period and assess their adequacy;
  (b) name the institutions responsible; and
  (c) indicate whether there has been any change over the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(iii) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.
(iv) Are these measures being implemented? **[YES/NO]**
(v) If the answer is **YES**, give a brief description of the measures. Indicate whether there has been any change over the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(vi) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.

Indicator 6.7

Availability and implementation of guidelines for forest road lay-out, including drainage requirements and conservation of buffer strips along streams and rivers.

Action To Be Taken

(i) Are there guidelines for forest road lay-out, including drainage requirements and conservation of buffer strips along streams and rivers? **[YES/NO]**
(ii) If the answer is **YES**:
  (a) list and describe the most recent guidelines available for the reporting period and assess their adequacy;
  (b) name the institutions responsible; and
  (c) indicate whether there has been any change over the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(iii) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.
(iv) Are these measures being implemented? **[YES/NO]**
(v) If the answer is **YES**, give a brief description of the measures. Indicate whether there has been any change over the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(vi) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.

Indicator 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.

Action To Be Taken

(i) Are there guidelines to cover harvesting procedures which protect the soil? **[YES/NO]**
(ii) If the answer is **YES**:
  (a) list and describe the most recent procedures available for the reporting period and assess their adequacy;
  (b) name the institutions responsible; and
  (c) indicate whether there has been any change over the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(iii) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.
(iv) Are these measures being implemented? **[YES/NO]**
(v) If the answer is **YES**, give a brief description of the measures. Indicate whether there has been any change over the last two years or since the most recent assessment (give date). If so, elaborate on the changes.
(vi) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.

Monitoring and Evaluation

Indicator 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.

This depends:

(a) upon the protection of representative areas of each forest type so that they may be used as controls against which changes in production forests may be assessed; and
(b) upon the operation of a monitoring system for water quality.

Action To Be Taken

(i) Are there national procedures for the protection of representative areas of each forest type? **[YES/NO]** (See also Indicator 5.8 Action (i)).

(ii) If the answer is **YES**:
   (a) list and describe the most recent procedures available for the reporting period and assess their adequacy;
   (b) name the institutions responsible; and
   (c) indicate whether there has been any change over the last two years or since the most recent assessment (give date). If so, elaborate on the changes.

(iii) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.

(iv) Are these measures being implemented? **[YES/NO]**

(v) If the answer is **YES**, give a brief description of the measures. Indicate whether there has been any change over the last two years or since the most recent assessment (give date). If so, elaborate on the changes.

(vi) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.

Criterion 7: Economic, Social and Cultural Aspects

This criterion deals with the economic, social and cultural aspects of the forest, besides those mentioned under Criterion 4 - Flow of Forest Produce, Criterion 5 - Biological Diversity and Criterion 6 - Soil and Water. In this regard, a well-managed forest is a constantly self-renewing resource and it produces a host of benefits, ranging from high quality timber to satisfying the basic needs of people living in and around the forest. It also contributes to the well-being and enhances the quality of life of the population in providing opportunities for recreation and ecotourism, as well as in generating employment and investment in the processing industries. Hence, if sustainably managed, the forest has the potential to make an important contribution to the overall sustainable development of the country.

Socio-Economic Aspects

The very existence of forest is often dependent on the forest being able to generate sufficient financial resources to ensure its sustainability, besides providing employment and other social and environmental benefits to society.

Indicator 7.1

Value and percentage contribution of the forestry sector to the Gross Domestic Product.

Action To Be Taken

(i) Collect data from national reports on values and percentage contribution of the forestry sector to the Gross Domestic Product for the previous five years to indicate trends on the importance of the sector in the national economy.
(ii) Complete the information as required in Table 7.1.

Table 7.1: Value and Percentage Contribution of the Forestry Sector to Gross Domestic Product (GDP)

Year	Contribution to GDP	
	Value (1000 US$)+	Percent of Total GDP (%)
y*-5		
y-4		
y-3		
y-2		
y-1		

* y = year of reporting.
\+ Quote exchange rate applied.

Indicator 7.2

Quantity (volume) and value of wood and non-wood forest products traded in:

(a) the domestic market, and
(b) the international market.

Action To Be Taken

(i) Collect data on the average annual quantity and/or value of wood and non-wood forest products traded in the domestic and international markets for the previous five years and compute the average quantity and value traded to indicate the relative importance of trade in the domestic and international markets.
(ii) Complete the information as required in Table 7.2.

Table 7.2: Quantity and Value of Forest Products
Traded in the Domestic and International Markets

Main Forest Product*	Markets					
	Domestic			International		
	Average Annual Value (1000 US$)+	Average Annual Quantity		Average Annual Value (1000 US$)	Average Annual Quantity	
		Unit**	Total		Unit	Total
Product 1						
Product 2						
Product 3						
:						
:						
Product n						

* Include wood and non-wood forest products.
\+ Quote exchange rate applied.
** Indicate the appropriate unit of measurements used.

Indicator 7.3

Quantity (volume) and value of wood and non-wood forest products for subsistence use, including fuelwood.

Action To Be Taken

(i) Collect data on the quantity and/or value of wood and non-wood forest products for subsistence use, including fuelwood for the previous year.
(ii) Complete the information as required in Table 7.3.

Table 7.3: Quantity and Value of Forest Products for Subsistence Use

Forest Product*	Value (1000 US$)+	Quantity	
		Unit**	Total
Product 1			
Product 2			
Product 3			
:			
:			
Product n			

* Include wood and non-wood forest products, and fuelwood.
\+ Quote exchange rate applied.
** Indicate appropriate unit of measurements used.

Indicator 7.4

Ratio of domestic log production to the processing capacity of wood-based industries.

Action To Be Taken

(i) Collect data on domestic log production and the processing (installed) capacity of the wood-based industries utilising logs, based on an eight-hour shift, for the previous five years.

(ii) Compute the ratio of domestic log production to that of the processing capacity of the wood-based industries so as to indicate the proportion of logs consumed by the wood-based industries, especially the primary processing industries.

(iii) Complete the information as required in Table 7.4 which will also indicate trends in the utilisation of domestic logs by the wood-based industries.

Table 7.4: Ratios of Domestic Log Production to Processing Capacity of Wood-Based Industries

Year	Domestic Log Production ($1000\ m^3$) (1)	Capacity of Wood-Based Industries ($1000\ m^3$) (2)	Ratio+ (3)
y*-5			
y-4			
y-3			
y-2			
y-1			

* y = year of reporting.

\+ Column (3) = column (1) ÷ column (2).

Indicator 7.5

Efficiency of utilisation in terms of the percentage of felled volume processed.

Action To Be Taken

(i) Collect information on the volume (merchantable) of felled logs.

(ii) Record the volume of felled logs delivered and processed by the wood-based industries that utilise logs and their corresponding volume of products produced for the previous five years.

(iii) Compute the percentage utilised in terms of felled logs and those delivered and processed by the wood-based industries to indicate trends in utilisation of felled volume processed.

(iv) Complete the information as required in Table 7.5.

Table 7.5: Efficiency of the Wood-Based Industries

Year	Log Volume Felled ($1000\ m^3$) (1)	Log Volume Processed ($1000\ m^3$) (2)	Volume of Products Produced ($1000\ m^3$) (3)	Products as Percentage of Log Volume Felled+ (%) (4)	Products as Percentage of Log Volume Processed** (%) (5)
y*-5					
y-4					
y-3					
y-2					
y-1					

* y = year of reporting

\+ Column (4) = 100 x {column (3) ÷ column (1)}.

** Column (5) = 100 x {column (3) ÷ column (2)}

Indicator 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.

Action To Be Taken

(i) Assess whether the mechanisms for the distribution of incentives are effective and the sharing of costs and benefits among interested parties is fair and equitable? In making this assessment, the interested parties should be consulted and the following matters be considered:
   (a) the equitable treatment of interested parties in activities related to the use and management of forests;
   (b) the opportunity for interested parties to be employed under comparable conditions to those in other economic sectors;
   (c) the existence of effective mechanisms for communication and resolution of conflicts between interested parties;
   (d) the possession by the public of an effective voice in decisions relating to forest management;
   (e) the share of the profits received by forest companies to be reasonable in relation to benefits received by other parties; and
   (f) forest landowners or right-holders (government, private, community etc.) to receive a fair return for the use of their forest lands.

(ii) If the result of the assessment is broadly positive:
   (a) list and describe the most recent procedures available for the reporting period and assess their adequacy;
   (b) name the institutions responsible; and
   (c) indicate whether there has been any change over the last two years or since the most recent assessment (give date). If so, elaborate on the changes.

(iii) If the answer is broadly negative, give details of any action planned. Identify any constraints in taking this action.

(iv) Are these measures being implemented? **[YES/NO]**

(v) If the answer is **YES**, give a brief description of the measures. Indicate whether there has been any change over the last two years or since the most recent assessment (give date). If so, elaborate on the changes.

(vi) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.

Indicator 7.7

Existence and implementation of procedures to ensure the health and safety of forest workers.

Action To Be Taken

(i) Are there procedures to ensure the health and safety of forest workers? **[YES/NO]**

(ii) If the answer is **YES**:
   (a) list and describe the most recent procedures available for the reporting period and assess their adequacy;
   (b) name the institutions responsible; and
   (c) indicate whether there has been any change over the last two years or since the most recent assessment (give date). If so, elaborate on the changes.

(iii) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.

(iv) Are these measures being effectively implemented? **[YES/NO]**

(v) If the answer is **YES**, give a brief description of the measures. Indicate whether there has been any change over the last two years or since the most recent assessment (give date). If so, elaborate on the changes.

(vi) If the answer is **NO**, give details of any action planned. Identify any constraints in taking this action.

Indicator 7.8

Employment in the forestry sector:

(a) number employed,
(b) percentage of total work force,
(c) average wage rate, and
(d) injury rate.

Action To Be Taken

(i) Collect data on employment in the forestry sector for each of the items (a) to (d) above for the previous five years so as to indicate trends.
(ii) Complete the information as required in Table 7.8.

Table 7.8: Statistics of Employment in the Forestry Sector

Item	Year				
	y*-5	y-4	y-3	y-2	y-1
Total number employed					
Percentage of total work force (%)					
Average wage rate (US$)+					
Total number injured					
Injury rate					

* y = year of reporting.
\+ Quote exchange rate applied.

Indicator 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.

Action To Be Taken

(i) Identify forest areas earmarked for each of the items (a) to (d) above.
(ii) Compile the number and extent (area) of forest sites available for each of the items (a) to (d) for the year of reporting.
(iii) Complete the information as required in Table 7.9.

Table 7.9: Number and Extent of Forest Sites for Research, Education, Local Communities' Use and Recreation

Type of Forest Site	Number	Area (100 ha)
Research		
Education		
Local communities' use		
Recreation		

Indicators 7.10 and 7.11

(a) Number of people dependent on the forest for subsistence uses and traditional and customary lifestyles (Indicator 7.10).

(b) Area of forest upon which people are dependent for subsistence uses and traditional and customary lifestyles (Indicator 7.11).

Action To Be Taken

(i) Identify and determine the extent of forest areas earmarked for use by people for subsistence, traditional and customary lifestyles.
(ii) Collect data on the number of people dependent on forests.

(iii) Describe the nature of this dependence as mentioned in items (i) and (ii) above.

Indicator 7.12

Number of visitors to forest for recreational purposes.

Action To Be Taken

(i) Maintain a Visitors' Book for each forest site earmarked for recreational purposes.
(ii) Record the number of people visiting each site.
(iii) Complete the information as required in Table 7.12 for the previous five years so as to indicate the trends in usage of such sites.

Table 7.12: Number of Visitors to Recreational Forests

Year	Total Number of Sites	Total Number of Visitors
y*-5		
y-4		
y-3		
y-2		
y-1		

* y = year of reporting.

Indicator 7.13

Total amount of carbon stored in forest stands.

Action To Be Taken

(i) Estimate the volume of standing timber through forest resource appraisals.
(ii) Calculate the biomass based on the volume of standing timber.
(iii) Compute the amount of carbon stored in the forest stand for the previous five years which will indicate the role of forests as carbon sinks and the trends in carbon storage by forests.
(iv) Complete the information as required in Table 7.13.

Table 7.13: Carbon Storage of Forest Stands

Year	Total Carbon Stored (1000 tonnes)
y*-5	
y-4	
y-3	
y-2	
y-1	

* y = year of reporting

Cultural Aspects

Forests also act as important reservoirs for archaeological and cultural sites. These are areas containing one or more specific natural, archaeological or cultural features of outstanding or unique value because of their inherent rarity, representative or aesthetic qualities or archaeological and/or cultural significance.

Indicator 7.14

Number of important archaeological and cultural sites identified, mapped and protected.

Action To Be Taken

(i) Calculate the number of important archaeological and cultural sites in forested areas.
(ii) Map and protect them from harmful anthropogenic activities, such as logging, illegal cultivation etc.
(iii) Complete the information as required in Table 7.14.

Table 7.14: Status of Archaeological and Cultural Sites

Archaeological and Cultural Sites		
Total Number	**Number Mapped**	**Number Protected**

Community Participation

Community participation at all levels of forestry operations is vital to ensure transparency and accountability in forest management, conservation and development, as well as to ensure that their interests and concerns are taken into account in all aspects of forestry activities. This will often require a much more open attitude on the part of forestry services, government officials and forest owners, and through this the trust of the local population can be further strengthened.

Indicator 7.15

Extent to which tenure and user rights over the forest are documented and recognised.

Action to Be Taken

(i) Identify tenure and user rights of forest.
(ii) Describe, for the year of reporting, the extent to which the tenure and user rights are documented and recognised by law.

Indicator 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.

Action To Be Taken

(i) Identify legal and customary rights of indigenous people and local communities, forest dwellers and forest-dependent communities.
(ii) Describe, for the year of reporting, the extent to which these rights are considered and recognised in forest planning and management practices and related processes. In making this assessment, the interested parties should be consulted.

Indicator 7.17

Extent of participation by indigenous people and local communities, forest dwellers and other forest-dependent communities in forest-based economic activities.

Action To Be Taken

(i) Identify the forest-based economic activities participated in by indigenous people and local communities, forest dwellers and other forest-dependent communities.
(ii) Describe, for the year of reporting, the level of participation by indigenous people and local communities, forest dwellers and other forest-dependent communities in forest-based economic activities. In making this assessment, the interested parties should be consulted.

Indicator 7.18

Number of agreements involving local communities in co-management responsibilities.

Action To Be Taken

(i) Identify the number of agreements involving local communities in co-management responsibilities.
(ii) Describe, for the year of reporting, the extent of their involvement in co-management responsibilities. In making this assessment, the interested parties should be consulted.

Appendix 1

Definitions of the Protected Area Categories[4] 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 physiographic 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 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,

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4 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 Headquarters in Gland, Switzerland or John Waugh at IUCN-U.S.

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.'[5] 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

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

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.

Appendix 2

New (post-1994) IUCN Endangerment Status Categories[6]

Extinct (Ex)
A species is Extinct when there is no reasonable doubt that the last individual has died.

Extinct in the Wild (EW)
A species is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalised population (or populations) well outside the past range. A species is presumed extinct in the wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the species's life cycle and life form.

Critically Endangered (CR)
A species is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.

Endangered (EN)
A species is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future.

Vulnerable (VU)
A species is vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future.

Lower Risk (LR)
A species is Lower Risk when it has been evaluated, but does not satisfy the criteria for any of the categories, Critically Endangered, Endangered or Vulnerable.

Data Deficient (DD)
A species 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 species 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 or Lower Risk. Listing of species in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases, great care should be exercised in choosing between DD and threatened status. If the range of a species is suspected to be relatively circumscribed, if a considerable period of time has elapsed since the last record of the species, threatened status may well be justified.

Not Evaluated (NE)
A species is Not Evaluated when it has not yet been assessed against the criteria.

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6 For further information please contact the Information Officer, World Conservation Monitoring Centre, 219 Huntingdon Road, Cambridge CB30DL, United Kingdom.

Appendix 3

Land ownership

(FRA 2000 Terms and Definitions. Forest Resources Assessment Programme, FAO, Rome, 1998)

Land ownership classes for Forest and Other Wooded Land are defined below. Land ownership shall be reported for Forest area as a whole or by Natural Forest and Plantations respectively.

Land ownership	Definition
Public ownership	Belonging to State or other public bodies.
State ownership	Owned by national, state and regional governments or by government-owned corporations.
Owned by other public institutions	Belonging to cities, municipalities, villages and communes. Includes: any publicly owned forest and other wooded land not elsewhere specified.
Owned by indigenous and tribal peoples	Owned by indigenous and tribal peoples in independent countries, defined as those who: 1. are regarded as indigenous on account of their descent from the populations 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 of their own social, economic, cultural and political institutions; 2. are tribal peoples 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. For both categories (1) and (2) self-identification as indigenous or tribal shall be regarded as the fundamental criterion for determining the groups. (Source: ILO Convention No. 169 on 'indigenous and tribal peoples').
Private ownership	Forest and other wooded land owned by individuals, families, co-operatives or corporations engaged in agriculture or other occupations as well as forestry; private forest (wood-processing) industries; private corporations and other institutions (religious and educational institutions, pension or investment funds, etc.).
Owned by individuals	Forest and other wooded land owned by individuals and families, including those who have formed themselves into companies, including companies that combine forestry and agriculture (farm forests). Includes cases where owners do not live on or near their forest holdings (absentee owners).
Owned by forest industries	Forest and other wooded land owned by private forestry or wood-processing industries.
Owned by other private institutions	Forest and other wooded land owned by private corporations, co-operatives or institutions (religious, educational, pension or investment funds, nature conservation societies, etc.).

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