



# **Forestry Department**

**Food and Agriculture Organization of the United Nations**

## **GLOBAL FOREST RESOURCES ASSESSMENT 2010**

### **GUIDELINES FOR COUNTRY REPORTING TO FRA 2010**

ROME, JANUARY, 2008



## The Forest Resources Assessment Programme

Sustainably managed forests have multiple environmental and socio-economic functions which are important at the global, national and local scales, and they play a vital part in sustainable development. Reliable and up-to-date information on the state of forest resources - not only on area and area change, but also on such variables as growing stock, wood and non-wood products, carbon, protected areas, use of forests for recreation and other services, biological diversity and forests' contribution to national economies - is crucial to support decision-making for policies and programmes in forestry and sustainable development at all levels.

FAO, at the request of its member countries, regularly monitors the world's forests and their management and uses through the Forest Resources Assessment Programme. The Global Forest Resources Assessment 2010 (FRA 2010) has been requested by the FAO Committee on Forestry in 2007 and will be based on a comprehensive country reporting process, complemented by a global remote sensing survey. The assessment will cover all seven thematic elements of sustainable forest management, including variables related to the policy, legal and institutional framework. FRA 2010 is also aimed at providing information to facilitate the assessment of progress towards the Global Objectives on Forests of the United Nations Forum on Forests and the 2010 Biodiversity Target of the Convention on Biological Diversity. Results are expected to be published in 2010.

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More information on the Global Forest Resources Assessment can be found at:  
[www.fao.org/forestry/fra](http://www.fao.org/forestry/fra)

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The FRA Working Paper Series provides an important forum for the rapid release of information related to the FRA programme. Should users find any errors in the documents or would like to provide comments for improving their quality they should contact [fra@fao.org](mailto:fra@fao.org).

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## Abbreviations

AG	Advisory Group to FRA
C&I	Criteria and Indicators (for Sustainable Forest Management)
CBD	Convention on Biological Diversity
COFO	Committee on Forestry
CPF	Collaborative Partnership on Forests
CSD	United Nations Commission on Sustainable Development
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	FAO Statistical Databases
FRA	Global Forest Resources Assessment
GPG	Good Practice Guidance
IFF	Intergovernmental Forum on Forests
IPCC	International Panel on Climate Change
IPF	Intergovernmental Panel on Forests
ISCED	International Standard of Classification of Education
ISIC	International Standard Industrial Classification of all Economic Activities
ITTO	International Tropical Timber Organization
IUCN	The World Conservation Union
JFSQ	Joint Forest Sector Questionnaire
LULUCF	Land Use, Land Use Change and Forestry
MDG	Millennium Development Goals
NWFP	Non-Wood Forest Products
OWL	Other Wooded Land
OWLTC	Other Wooded Land With Tree Cover
PFE	Permanent Forest Estate
SOFO	State of the World's Forests
SFM	Sustainable Forest Management
UNCCD	United Nations Convention to Combat Desertification
UNCSD	United Nations Commission on Sustainable Development
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNFF	United Nations Forum on Forests
UNFCCC	United Nations Framework Convention on Climate Change

# 1 How to read and use this document

This document contains guidelines for the National Correspondents (NC) on how to prepare the Country Reports to FRA 2010. It explains both the general methodology that should be applied and gives specific guidance for the completion of each of the 17 National Reporting Tables. Together with the Specification of National Reporting Tables and Terms and Definitions documents, it constitutes the main reference documentation for the FRA 2010 reporting process.

Chapter 2 outlines the background and history of FAOs Global forest resources assessments.

Chapter 3 outlines the country reporting process and the time schedule and deadlines.

Chapter 4 – General Guidelines – the instructions given in this chapter are generic and should be read carefully. The chapter contains detailed instructions on how to select data sources, document references to the data sources, and how to process and document national data in order to fill in the National Reporting Tables. The chapter also provides guidance on how to proceed when data are incomplete or missing, etc.

Chapter 5 contains guidelines to the specific reporting tables. It contains direction on how to handle particular cases related to specific tables and aims at facilitating reporting and improving the understanding on how to interpret the definitions and categories set out in the document “Specification of National Reporting Tables”.

Appendices contain reference information and a wide variety of default values, conversion and expansion factors:

Appendix 1 – Complete example of country reporting for table T1

Appendix 2 – List of UN official country areas

Appendix 3 – Industrial roundwood and woodfuel production

Appendix 4 – General weight and volume conversion factors

Appendix 5 – Default values and conversion factors for estimating biomass and carbon

## 2 Global forest resources assessments

### Background

At the request of its member countries, FAO has been carrying out global forest resources assessments since 1946, practically since FAO was formed. The mandate to carry out these assessments stems both from the basic statutes of FAO and the Committee on Forestry (COFO). Global forest resources assessment reports have been published at periodic intervals. The latest of these reports, FRA 2005, was published in 2006. More than 800 people were involved in the process – including 172 National Correspondents and their teams.

### Objectives

The main objectives of the global forest resources assessment are:

- to provide consistent, high-quality information on the status and trends of forest resources worldwide, to facilitate improved policies related to forests and forest management;
- to provide validated information required for other forest related international conventions and processes. For example, the reporting tables on biomass and carbon follow the reporting requirements established by IPCC. Similarly, the FRA 2010 reporting now includes several indicators related to international processes on biodiversity, Criteria & Indicators for sustainable forest management, etc. FRA 2010 will provide information to the Convention on Biological Diversity (CBD) on forest-related indicators for the 2010 Biodiversity Target;
- to help countries view their forest sector within regional and global environmental and socioeconomic contexts;
- to provide data that can be used in technical studies and in support of investment decisions and private-sector development;
- to present relevant information on forests to wider communities, including other sectors, non governmental organizations and the general public.

FAO's global assessments also contribute to the improvement of concepts, definitions and methods related to forest resources assessments. Efforts are made to harmonize and streamline reporting with other international forest-related processes within the framework of the Collaborative Partnership on Forests (CPF), as well as to harmonize forest related definitions. The assessment is thus expected to help reduce the reporting burden on countries by providing information required by regional and international processes and agreements.

The FRA process is closely coordinated with other global reporting processes related to forests and implemented by FAO, such as the Joint Forest Sector Questionnaire (JFSQ) that annually collects information on forest production and trade, and to the national forest programme (nfp) updates that collect detailed information on the policy, legal and institutional framework related to forests. FAO subject specialists have been closely involved in the development of the FRA 2010 reporting framework and will participate in the analysis of the data.

The FRA process also works closely with regional reporting processes related to forests. In particular, the UNECE/FAO Timber Section in Geneva plays an instrumental role for the coordination of the FRA reporting process, for Europe.

### **Implementation (FRA 2010)**

The Global Forest Resources Assessment 2010 (FRA 2010) consists of four main components:

- A country reporting process, where the countries are requested to submit country reports to FAO, following a standardized reporting format and methodology.
- A complementary remote sensing assessment, aiming at providing information of forest change processes/dynamics over the last 30 years on global, regional and biome level, which will allow for a better understanding of the extent and causes of deforestation, forest degradation and fragmentation.
- A series of special studies on important topics and emerging issues where limited quantitative information is available.
- Information provided by external data providers, including information on threatened species, ratification of international agreements, etc.

This document focuses only on the country reporting process. Separate guidance will be given for the remote sensing assessment.

For more details regarding the Global Forest Resources Assessment, please visit the FAO Website at: [www.fao.org/forestry/fra](http://www.fao.org/forestry/fra).

### 3 Country reporting to FRA 2010

The main activities of the country reporting process for FRA 2010 are outlined below to give an overview of the process and the deadlines.

Activity	Tentative date	Comment/output
Global meeting of National Correspondents (Rome)	3-7 March 2008	Launch of the FRA 2010 country reporting process. Training of National Correspondents and work on national reporting tables.
Regional and sub-regional workshops	April 2008 – December 2008	Further training of national correspondents, technical assistance and review of draft country reports.
Deadline for submission of draft country reports	March 2009	Countries are strongly encouraged to submit draft reports well in advance of the deadline.
Deadline for submission of final country reports	May 2009	
Validation of final country reports	July-August 2009	Official request for validation of the final country reports will be sent to countries.
Launch of FRA 2010 Key Findings	April 2010	
Launch of FRA 2010 Main report	December 2010	

The Global Forest Resources Assessment relies on information provided by countries. FAO has established a framework for national reporting and conducts training and provides guidance to the National Correspondents where needed in order to ensure that the information provided is complete and, as far as possible, compatible with the specifications of the FRA reporting tables.

National Correspondents are requested to submit their country reports following a standardized format in order to facilitate the publication and the compilation of data. Most countries will receive a partially pre-filled document where the FRA secretariat has inserted information from the FRA 2005 country reports wherever applicable. This pre-filled report should be used as the base for further editing and amendments. In case where no information is available (e.g. newly independent states or new reporting units), countries will receive an empty report template.

The country reports should be submitted to FAO (preferably by e-mail or on diskette/CD-ROM) before the end of March 2009. The FRA team will review the report and ask for clarifications and amendments if needed. Once the review is completed, countries will be asked for an official validation before publishing. Note that FAO does not require National Correspondents to obtain official approval before submitting the draft report. The country reports should be written in English, French or Spanish and will after validation be made publicly available on the Internet.

The reporting tables for FRA 2010 are comprehensive, and in many cases it will be necessary to form a multidisciplinary team in order to cover all aspects of the report. It may also take some time to identify and locate national data; it is therefore recommended that National Correspondents carry out the necessary steps for getting started with the process as soon as possible in order not to delay the submission of the country report. The National Correspondents are strongly encouraged to submit their reports well in advance of the deadline. This gives more time for the review and for making adjustments or amendments to the reports when necessary. Please note that countries may submit a partial draft report at an



early stage for a first review of the key tables by the FRA-team. This approach may save time when compiling the report as many tables build on each other.

Table 1. Overview of the National Reporting Tables

Table	Title	Reporting unit	Reporting year				
			1990	2000	2005	2008	2010
T1	Extent of forest and other wooded land	1000 hectares	x	x	x		x
T2a	Forest ownership	1000 hectares	x	x	x		
T2b	Holder of management rights of public forests	1000 hectares	x	x	x		
T3a	Primary designated function	1000 hectares	x	x	x		x
T3b	Special designation and management categories	1000 hectares	x	x	x		x
T4a	Characteristics	1000 hectares	x	x	x		x
T4b	Special categories	1000 hectares	x	x	x		x
T5	Forest establishment and reforestation	1000 hectares	x	x	x		
T6a	Growing stock	Million m <sup>3</sup>	x	x	x		x
T6b	Growing stock of the 10 most common species	Million m <sup>3</sup>	x	x	x		
T7	Biomass stock	Million metric tonnes	x	x	x		x
T8	Carbon stock	Million metric tonnes	x	x	x		x
T9a	Forest fires	Number of fires and area (1000 hectares)	x	x	x		
T9b	Proportion of planned fires and wildfires in forest	Percent	x	x	x		
T10a	Other disturbances affecting forest health and vitality	1000 hectares	x	x	x		
T10b	Major outbreaks of insects and diseases affecting forest health and vitality	1000 hectares	Year of latest outbreak				
T10c	Area of forest affected by woody invasive species	1000 hectares			x		
T11	Wood removals and value of removals	1000 m <sup>3</sup> and value	x	x	x		
T12	Non-wood forest products removals and value of removals	Quantity and value			x		
T13	Employment	1000 years full-time equivalents	x	x	x		
T14	Policy and legal framework	Not applicable				x	
T15a	Institutions	Not applicable				x	
T15b	Human resources	Number of persons and percent female		x	x	x	
T16	Education and research	Number of persons		x	x	x	
T17a	Forest revenues	Value		x	x		
T17b	Public expenditure in forest sector by funding source	Value		x	x		

Note: Shaded cells means that the reported values correspond to an average for a five year period.

## 4 General guidelines

### Introduction

These guidelines have been developed in order to facilitate the preparation of the FRA 2010 country reports. They explain the methodology that should be applied when compiling the country report in order to ensure complete, consistent and transparent reports where all reported figures can be traced back to the original data and data source.

The preparation of the country report for FRA is an important task. The data provided in the country report will be compiled and published by FAO and will be widely used as a reference information regarding the world's forests. Once the country reports have been officially validated, the reports will be made publicly available online.

National Correspondents are encouraged to contact the FRA team for advice if they are in doubt on how to proceed when available data do not allow for compiling the information requested!

### Pre-filled reports

In order to facilitate the country reporting, the FRA secretariat has, whenever applicable, pre-filled the country reports with the information submitted to FRA 2005. It should be noted that the reports are only partially pre-filled and must therefore be thoroughly revised and amended.

When the pre-filled information in a reporting table corresponds to the most recent and best available data, the table could be completed by just making the forecast for year 2010. Should a country prefer to start from the beginning with their country report without using the pre-filled report provided, an empty country report template can be used.

If new and better data are available, the new data sources must be documented as well as the new data. The entire table must then be revised, as the new data may affect estimated trends. Consequently, the historical figures reported to FRA 2005 (1990, 2000 and 2005) can also be affected. Whenever previously reported (FRA 2005) figures are changed, the reason for the change must be documented in the country report under "Other general comments".

### Filling-in the tables

When filling-in a reporting table **no fields must be left blank**. If an entire table is not reported upon, all fields can be left blank and the reason for not reporting should be noted in the "Other general comments" field e.g. "No data available for reporting on this table".

When filling in a reporting table for a category where national data are missing or so weak that they cannot be used for generating some of the requested information, countries may write "n.a." (not available) in corresponding fields in the reporting table. Knowing that no national data are available is in itself very important information and should be documented in the country report.

Note that “n.a.” is not allowed for the categories in table T1 Extent of forest and other wooded land, T2a Forest ownership, T3a Primary designated function, and T4a Characteristics with the exception of the sub-categories beginning with “...of which...”.

Further note that some tables may contain categories which are not applicable for all countries (e.g. T4b Special categories which include: rubber plantations, mangroves and bamboo). In these cases, zero (0) should be used to fill in the table and “Not applicable” added in the comments.

### **Expert estimates**

When documented national data are weak or missing, countries can make expert estimates to fill in the requested information, as long as it is clearly documented in the country report in the respective field under “Comments related to data, definitions, etc”. In particular, the countries are encouraged to make expert estimates in the following cases:

- in order to make time series complete
- in order to make categories add up to a total

### **Five-year averages**

For reporting tables T5 Forest establishment and reforestation, T9a Forest fires, T10a Other disturbances affecting forest health and vitality and T11 Wood removals and value of removals. The reported figures for the reporting years should be based on averages for the five-year periods 1988-1992, 1998-2002 and 2003-2007. If data are not available to produce five year average this should be documented along with information on how the value for the reporting year(s) was reached. It could be the actual value for the reference year, if available, but preferably it should be an average value of two or more years. Please note that all original data used for the averages must be properly documented under original data.

### **Formatting**

The structure of the reporting tables may not be altered in any way. **Do not insert any rows or columns or change the order of categories and reporting years.** The specified measurement unit (1000 ha, Million m<sup>3</sup>, etc.) must be respected even for very small or very large numbers.

Values may be reported with or without decimals. As a rule of thumb, small values (less than 100) should be reported with decimals so the value has at least three (3) significant digits (e.g. 1.23).

When reporting decimals, the dot (.) should be used as separator. Numbers larger than 1000 may use a blank space to separate the thousands (groups of three digits). No other separators should be used.

The selection in the “Tick boxes” in tables T2a Forest ownership, T14 Policy and legal framework, T15a Institutions and T17a Forest revenues: should be marked with an “X”.

These formatting rules are very important as the entire tables will be inserted into the FAO database, and a proper formatting reduces the risk for errors.

### **Comment fields**

The comment fields are very important for the understanding of reported data and for the further processing and analysis of data. Countries are strongly encouraged to document any relevant comments in appropriate comment field. For all reporting tables (except tables T14-T17) three comment fields are provided for countries to insert comments. Countries are encouraged to keep comments short and concise.

#### 1. Comments related to data, definitions, etc.:

Relevant information related to data, definitions, data sources, data quality, etc should be made in this field.

#### 2. Comments on reported trend:

All comments related to the understanding and correct interpretation of reported trends.

#### 3. Other general comments:

Space for documentation of any general information related to the reporting table.

### **Reporting methodology**

The standard methodology to be applied to all reporting tables is a process that consists of several steps as outlined below and further explained in the following sections.

1. Identification, selection and documentation of data sources.
2. Documentation of national classes and definitions used and original data for each dataset.
3. Analysis of national data (usually includes three steps).
  - Step 1 – Calibration (applicable only to area-related tables).
  - Step 2 – Estimation and forecasting to FRA reporting years.
  - Step 3 – Reclassification of national data to FRA categories.

### **Identification, selection and documentation of data sources**

Based on the requirements of each specific reporting table, the NC should identify all potentially useful data sources and evaluate the data sources according to content, completeness, quality and compliance with FRA definitions.

The selected data sources, their references and the corresponding data should be documented, following the structure outlined in the country report template (see example 1, next page).

The documentation of each data source should cover the following:

- Full reference: Author(s), year of publication (if published) and title.
- Quality assessment, according to the following classes:
  - High quality
  - Medium quality
  - Low quality
- Reference year(s) for the data. Note that the reference year is the year that the data refer to, not the year of publication.
- Coverage (complete national coverage or partial coverage)

Example 1. Documentation of data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
a) Smith, B 1988. <i>National Pine forest and mangrove inventory.</i> Hypothetical country	M <sup>1</sup>	Land use, Forest cover, Growing stock	1986	National inventory of pine and mangrove forests covering the whole country, using remote sensing.

<sup>1</sup> Assessed as Medium quality “M”. The source document provides information based on remote sensing without field sample plots.

### Documentation of national definitions and original data

Countries should document the original national data that constitute the basis for the estimates in the table. Countries should further clearly document the national definitions for each data source. Note that only the original data relevant for each specific reporting table and used for the further analysis need to be documented. This might be done in one or several tables, depending on the complexity of the data. There is no predefined format for these tables, as data structures may vary between countries.

It is very important to report also when no data or information are available (see also sections Filling-in the tables and Expert estimates).

### Analysis of national data

The analysis of national data comprises three steps that may or may not be necessary to carry out, depending on the nature of the national data. These include:

- Calibration
- Estimation and forecasting
- Reclassification

The order in which these steps are carried out may vary depending on the structure of data. Calibration is usually carried out first on all national datasets, thereby adjusting the datasets to the official land area.

If the national datasets use the same national classes, it is recommended to then make the estimation and forecasting and conclude with the reclassification to FRA classes. This approach ensures that the trends according to the national classes can be properly documented.

Sometimes the national datasets use different classes and cannot be directly compared. In these cases it is recommended to first make the reclassification of each data set into the FRA categories and then perform the estimation and forecasting of the FRA categories.

When aggregating (adding) sub-national data with different reference years the different estimates should first be brought to a common reference year before the sub-national figures are added up. If the definitions/classifications differ between different sub-national data sets then a harmonization of national classes or reclassification to the FRA categories is necessary prior to adding the various estimates.

All assessments should be based on the most accurate information available, not simply a repetition of a previous estimates or the result of an old inventory/assessment. Where a time series is available, the estimates can be calculated by simple interpolation. If the latest inventory is considered more accurate than earlier inventories, then this should be taken into account and an attempt made to project the results back in time.

If time series indicate trends that, according to the professional judgment of the NC and/or other specialists taking part of the FRA reporting process, do not reflect the real situation, this must be documented in the country report. In such cases, countries should make an adjustment of the estimated / forecasted data, and clearly document and justify this in the country report.

As a general rule, the documentation in the country report should follow the order in which the activities were carried out.

## **Calibration**

Calibration is carried out in order to ensure that the reported area and area-related quantitative figures are consistent. E.g. for table T1, the total land area/country area must match the official UN statistics in FAOSTAT.

For tables T2 – T4, calibration may be needed to make total area of forest match the corresponding figures in table T1. For other tables, calibration by area may sometimes be needed, particularly in cases when available data are partial.

## Example 2. Calibration

National category	1000 hectares
Forest	7 000
Bushland	3 000
Agriculture	3 000
Swamp	850
Urban land	100
Other	850
<b>TOTAL land area</b>	<b>14 800</b>

**Calculating the calibration factor**

Total land area according to FAOSTAT	15000
Calibration factor (= 15000/14800)	1.01351

**Calibrated national data will then be as follows**

National category	1000 hectares
Forest	7 095
Bushland	3 041
Agriculture	3 041
Swamp	861
Urban land	101
Other	861
<b>TOTAL land area</b>	<b>15 000</b>

### Estimation and forecasting

The estimation and forecasting of values is often necessary in order to report national data for the FRA reference years (1990, 2000, 2005 and 2010). The estimation is the process of interpolation between observations and forecasting is the extrapolation of values to the future.

In order to decide whether estimation and/or forecasting are necessary, the following general principles apply:

- If the country has data sources that provide observed data for the requested reporting years these data can be used directly without any estimation.
- If available data sets do not correspond to the requested reporting years, estimation and/or forecasting is required.
- Data for 2010 will always be forecasts.
- Forecasts may also be necessary for reference years 1990, 2000 and/or 2005 if the latest data set is older than the reference year.

The following examples show how estimation and forecasting can be carried out:

### Example 3. Estimation and forecasting using linear interpolation

Original data		
National class	Growing stock (million m <sup>3</sup> )	
	1988	2001
Forest	500	420
Bushland	300	330

  

Calculation of differences		
$\Delta x$ (2001-1988)	13	<i>(time between observations)</i>
$\Delta y_{\text{forest}}$ (420-500)	-80	<i>(difference between observed values)</i>
$\Delta y_{\text{bush}}$ (330-300)	30	<i>(difference between observed values)</i>
$\Delta y_{\text{forest}} / \Delta x$	-6.1538	<i>(difference per year)</i>
$\Delta y_{\text{bush}} / \Delta x$	2.3077	<i>(difference per year)</i>

  

Estimations			
National class	Growing stock (million m <sup>3</sup> )		
	1990	2000	
Forest	487.7	426.2	<i>(value 1988 + number of years after 1988 x <math>\Delta y_{\text{forest}} / \Delta x</math>)</i>
Bushland	304.6	327.7	<i>(value 1988 + number of years after 1988 x <math>\Delta y_{\text{bush}} / \Delta x</math>)</i>

### Example 4. Forecasting using linear extrapolation

Original data		
National class	Growing stock (million m <sup>3</sup> )	
	1988	1997
Forest	500	460
Other wooded land	300	320

  

Calculation of differences		
$\Delta x$ (1997-1988)	9	<i>(time between observations)</i>
$\Delta y_{\text{forest}}$ (460-500)	-40	<i>(difference between observed values)</i>
$\Delta y_{\text{owl}}$ (320-300)	20	<i>(difference between observed values)</i>
$\Delta y_{\text{forest}} / \Delta x$	-4.4444	<i>(difference per year)</i>
$\Delta y_{\text{owl}} / \Delta x$	2.2222	<i>(difference per year)</i>

  

Forecasting			
National class	Growing stock (million m <sup>3</sup> )		
	2000	2005	
Forest	446.7	424.4	<i>(value 1997 + number of years after 1997 x <math>\Delta y_{\text{forest}} / \Delta x</math>)</i>
Other wooded land	326.7	337.8	<i>(value 1997 + number of years after 1997 x <math>\Delta y_{\text{owl}} / \Delta x</math>)</i>

Estimation and forecasting can obviously be made using other methods than linear inter- or extrapolation as shown in the example above. Sometimes trends are not linear, and curvilinear relationships or several linear relationships (for different segments of the time series) can be applied.

It is important to stress that estimation and forecasting is not only an issue of making mathematical calculations. It is equally or even more important to assess whether the



estimated/forecasted figures reflect reality. Many times there may be particular reasons why data from different years vary, and such variations do not necessary imply that there is a trend that can be used for estimation and forecasting.

For EXCEL users, note that EXCEL has a built-in function for estimation and forecasting that can facilitate the calculations. See the EXCEL help on the function FORECAST for further information.

## **Reclassification**

The reclassification is made in order to make national data correspond to the categories defined for FRA. In some cases, when the national classes are identical to the FRA categories or when countries have National Forest Inventories that permit the direct calculation of data according to the FRA categories and definitions, the reclassification can be omitted.

Reclassification is usually carried out using a “reclassification matrix”, in which each national class is assigned a percentage that applies to each FRA category (see example 5).

Example 5. Reclassification matrix

	<b>FRA category 1</b>	<b>FRA category 2</b>	<b>FRA category 3</b>	<b>TOTAL</b>
<b>National class 1</b>	70%	20%	10%	100%
<b>National class 2</b>	30%	50%	20%	100%

For each reporting table, the National Correspondent must decide whether reclassification is needed and if so, elaborate a reclassification matrix, taking into account the different national classes and the FRA categories according to the table specifications. This is usually a subjective assessment (expert estimate), but if there is information available that supports this reclassification it should be documented. Also, if it is only based on expert estimates, this should be noted in the country report.

## Example 6. Reclassification

In the reclassification matrix below for table T1, the national classes and their respective area are listed on the left hand side. On the right hand side the FRA categories are found. For each national class, the percentage that belongs to each FRA category is assessed, making sure that the sum equals 100%. In the particular case of table T1, the category “Other land with tree cover” (OLWTC) is a subcategory of “Other land” and included therein, hence it has been put outside the total, and the percentages in this column refers to the percentage of the area under “Other land”.

### Reclassification matrix

National classes	1000 ha	FRA Categories				
		Forest	OWL <sup>1</sup>	Other land	Total	OLWTC <sup>2</sup>
Productive forest land	15 000	100%			100%	
Swamp	3 000		30%	70%	100%	
Agriculture land	8 000			100%	100%	5%
National parks	3 500	65%	20%	15%	100%	
Urban land	500			100%	100%	10%
<b>TOTAL</b>	<b>30 000</b>	<b>Not applicable</b>				

### Result of reclassification

National classes	1000 ha	FRA Categories				
		Forest	OWL <sup>1</sup>	Other land	Total	OLWTC <sup>2</sup>
Productive forest land	15 000	15 000			15 000	
Swamp	3 000		900	2 100	3 000	
Agriculture land	8 000			8 000	8 000	400
National parks	3 500	2 275	700	525	3 500	
Urban land	500			500	500	50
<b>TOTAL</b>	<b>30 000</b>	<b>17 275</b>	<b>1 600</b>	<b>11 125</b>	<b>30 000</b>	<b>450</b>

<sup>1</sup> OWL = Other wooded land

<sup>2</sup> OLWTC = Other land with tree cover. This is a sub-category of Other land, hence the percentage given in this reclassification matrix refers to the percentage of the area of Other land that has tree

Reclassification should be applied for each reporting year. Many times, the same reclassification matrix can be used for all reporting years, however, sometimes it might be necessary to make separate reclassification matrices for different years as the national data may come from different sources with different categories and definitions.

The output from the reclassification is the country data transformed to the FRA categories and if input data correspond to the FRA reporting years, the resulting data can be directly inserted in the relevant table in the country report.

## 5 Table specific guidelines

This chapter contains guidelines on how to handle particular cases related to specific reporting tables and aims at facilitating the reporting and improving the understanding on how to interpret the definitions and categories set out in the document “Specification of National Reporting Tables”.

### 5.1 T 1 *Extent of forest and other wooded land*

#### Introduction

This table is one of the core tables for FRA 2010. The area of forest as presented in this table constitutes the basis for reporting in many of the other reporting tables (T2a, T3a and T4a) and derivations of variables: for example, growing stock per hectare which is derived from growing stock and forest area. Strong efforts should be made to provide as reliable figures as possible.

This table also constitutes the basis for the estimate of changes in global forest area, which always attracts much interest from the international community. It is a key indicator in various international reporting processes, conventions and other instruments, such as the Millennium Development Goals, Convention on Biological Diversity, the United Nations Framework Convention on Climate Change, the United Nations Forum on Forest, Criteria and Indicator processes, etc.

#### Data sources

The FRA 2010 categories for this table are based on both land cover and land use. Countries may need to combine land cover and land use data in order to provide information for this reporting table.

For table T1, data sources are likely to include (but not restricted to) the following:

- Data and maps from vegetation mapping surveys
- Data and maps from land use planning
- Forest cover maps
- Agricultural maps
- Data and maps from national forest inventories

#### Special considerations for reporting

The countries must report areas on the four main categories **Forest, Other wooded land, Other land and Inland water**. The sub-category Other land with tree cover (OLWTC) forms a sub-category of Other land and its area is thus included in Other land and should not be counted double when adding the areas.

If there is no information on area of Other land, but good estimates of areas of Forest and Other wooded land, the area of Other land can be estimated by using Total land area and subtracting the area of Forest and Other wooded land.

It is important that all international reporting maintain the same data on area of country/territory, land area and inland water area. When compiling country data for table T1, these figures must match with the latest official UN statistics as maintained by FAO (See FAOSTAT, <http://faostat.fao.org/>)

The official area figures according to FAOSTAT can be found in Appendix 2. In the case that area figures do not match, a calibration should be performed as explained in Chapter 4, Example 2. When performing the calibration, it is generally recommended to use total land area as the basis. Area of inland water can then be taken directly from Appendix 2.

The area estimates for all years should be based on the current borders and area of the country/territory as of FAOSTAT 2005. Should borders and country/territory area have changed during the period of reporting or the country/territory did not exist at the time of an earlier reporting year, then reported figures should be calibrated to correspond to actual borders.

Should the area figures generally accepted by your country be different from those maintained by UN Statistics Division and/or FAOSTAT, the competent authority in your country should make sure that an official request is made to UN Statistics Division (for total country area) and to FAOSTAT (for land area and inland water area) to change the official figures. Once an official request is done, the updated figures may be used even if they are still not reflected in the on-line databases. Please note in the report that a request has been sent to [FAOSTAT@fao.org](mailto:FAOSTAT@fao.org) and/or [Statistics@un.org](mailto:Statistics@un.org) in order to change the official figures of country area and/or land area.

### **Specific cases:**

If areas with meadows and pastures are difficult to classify (whether they should belong to Forest/Other wooded land or to Other land), the country should explain the criteria used and how this classification is done. The general rule is to include the forest pastures in the area of Forest/Other wooded land, unless the grazing is so intensive that it becomes the predominant land use, in which case the land should be classified as Other land and as Other land with tree cover.

The general definition of Forest to be used for FRA 2010 is “Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use” and this should be the basis for country reporting whenever it is possible to derive this figure from national data sources. However, sometimes the national data sources do not allow making estimates with exactly the threshold specified in the definition. In such cases the countries should report to whatever threshold that is available and clearly document the threshold used in the comments to the table. The same threshold value must be used for all reporting years.

Appendix 1 contains a complete example of National Reporting Table T1. Although it addresses some specific issues for table T1, it also serves as a general example for reporting.

## **5.2 T 2 Forest ownership and management rights**

### **Introduction**

The allocation of forest ownership and management rights defines who exercises control over which forest resources, for how long, and under what conditions. Thus, the information on this variable is important for policy, institutional and management purposes.

This table has been changed and amended in relation to the reporting table for FRA 2005. First, ownership now refers to the forest resource (the trees) and not to the land. Second, private ownership has been further subdivided into several sub-categories, and third, a new table on management rights of public forests has been added.

### **Data sources**

For table T2, data sources are likely to include (but not be restricted to) the following:

- NFI data, if information on ownership is collected
- National forestry statistics
- Register of land titles
- Maps on land ownership
- Registers of concessions granted
- FRA 2005 Thematic study on forest ownership and resource tenure (<http://www.fao.org/forestry/site/38875/en> )

### **Special considerations for reporting**

It is important to recall that information on ownership only is requested for land that is classified as Forest. If national data on ownership is not specifically available for the forest area then the ownership categories must be distributed on the forest area as reported in table T1.

Many countries may have data on public ownership but limited data on private ownership. Notwithstanding, countries are encouraged to provide at least an expert estimate for the main category of Private ownership – but if there are no basis for further breaking it down into sub-categories, countries may leave these with “n.a.”.

If a country is reporting data under the category Other types of ownership the country should also specify and describe the particular kind of ownership that applies to the area reported under this category.

Regarding management rights of public forests, it may sometimes be difficult to decide whether a specific type of arrangement should be included or not. The key criterion for inclusion is that the arrangement should be “long-term” and also include the responsibility for management of the forest (not only for harvesting). There is no established specific threshold value for “long-term”, as this concept may vary between countries.

In some cases, there may also be an overlap between management rights, e.g. a NWFP concession may overlap a timber concession. In such cases, areas should not be double counted.

### **5.3 T 3 Forest designation and management**

#### **Introduction**

This table is a complement to table T1, as it further breaks down the Forest area according to primary designated function; it describes how the forest is intended to be managed and used.

Compared to FRA 2005, the table has been simplified in that it now only covers forest and the reporting on “Total area with function” has been removed. Furthermore, the table T3b on special designation and management categories has been added.

#### **Special considerations for reporting**

##### Table T3a

Primary designated functions are exclusive and should only be counted once – consequently the total area of Forest must match the corresponding figure in table T1.

Functions can be designated at different levels. As a general rule, the lowest level of designation should be used, i.e. management unit level.

#### **Specific cases:**

When parts of a forest area is designated for a particular use such as picnic areas and walking paths, one option to estimate the area of forest designated for recreation (part of social services) is to multiply the number of “sites” with an estimated average number of hectares per site. Countries using this option should indicate the assumptions in respective comment field to the table.

##### Table T3b

The Permanent Forest Estate (PFE) refers to forest land designated to be retained as forest and which may not be converted to other land uses. Countries vary in the way in which they define the degree of permanence. Some countries may have a PFE designated by the state and accorded a considerable degree of protection under the law. The PFE may contain both forest and non forest areas, note that the reported figures should refer only to the forest area within the PFE.

The concept of state-designated PFEs may not exist in some countries. In such instances, and in other cases where the degree of permanence is unclear, a judgement (expert estimate) has to be made about how much forest can be considered as designated as permanent forest.

Forest area under sustainable forest management refers to the national definition or description of sustainable forest management. Countries are asked to document in the country report the definition, as well as the criteria and the process applied for estimating the area under sustainable forest management.

The process applied for estimating the area under sustainable forest management may involve:

- Expert estimates by National Correspondent
- Expert estimates by National Correspondent through stakeholder consultation
- Specific study(ies)
- Information obtained from NFI/annual reports from forest owners and managers.
- Etc.

If no national definition or criteria exist, National Correspondents may use their own or the following criteria (ITTO, 2006):

Forest areas that fulfil any of the following conditions:

- i. have been independently certified or in which progress towards certification is being made;
- ii. have fully developed, long-term (ten years or more) forest management plans with firm information that these plans are being implemented effectively;
- iii. are considered as model forest units in their country and information is available on the quality of management;
- iv. are community-based forest management units with secure tenure for which the quality of management is known to be of high standard;
- v. are protected areas with secure boundaries and a management plan that are generally considered in the country and by other observers to be well managed and that are not under significant threat from destructive agents.

## **T 4 Forest characteristics**

### **Introduction**

Table T4a intends to characterize the structure and composition of forest ecosystems and the degree of human impact on these. The categories represent a continuum from undisturbed primary forests to planted forests with introduced tree species.

Compared with FRA 2005 the table on forest characteristics has undergone several changes in order to make it clearer and easier to report on. The concept of planted forests is introduced instead of forest plantations. Planted forest is a wider concept also covering the planted forest of native species that were considered semi-natural in FRA 2005. Further, the modified natural forests and the naturally regenerated component of the semi-natural forests are now merged into one new category – other naturally regenerated forests.

### **Data sources**

#### Table T4a

- The FRA 2005 Thematic study on planted forest (<http://www.fao.org/forestry/site/38995/en> )

#### Table T4b

- The FRA 2005 Thematic studies bamboo and mangroves.
- The FRA 2005 Thematic study on bamboo is available in English at <http://www.fao.org/forestry/site/38656/en>. The study contains detailed information on the bamboo resources for the 22 countries which participated in the FRA 2005 Thematic study on bamboo.
- The FRA 2005 Thematic study on mangroves available at <http://www.fao.org/forestry/site/40375/en> contains five regional working papers on *The world's mangroves 1980–2005*. The working papers provide detailed information on the mangroves in the 124 countries and areas in which they are found, in the official language of correspondence with each country (English, French or Spanish).

### **Special considerations for reporting**

The division into different categories of characteristics involves a number of criteria: regeneration methods, knowledge/visibility of human activities and predominance of native and/or introduced species.

The distinction between Planted forest and Other naturally regenerated forest is based on the regeneration method. If it is known or clearly visible that the forest land was regenerated through planting/seeding then it should be classified as Planted forest. If the forest is



established by natural regeneration, or if the regeneration method is unknown, it should be classified as Other naturally regenerating forest.

In the specific case of coppice, the distinction between Planted forest and Other naturally regenerated forest is based on whether the coppice is from trees were originally planted/seeded or established through natural regeneration.

The distinction between Primary and Other naturally regenerated forest is based on the degree of human impact. In order to classify a forest as Primary there should be no clearly visible indications/signs of human activities. Furthermore, primary forests should show natural forest dynamics, such as natural tree species composition, occurrence of dead wood, natural age structure and natural regeneration processes.

Whenever possible, the Planted forest and Other naturally regenerated forest should be further divided into the sub-category "...of which of introduced species" based on inventory data or expert estimates.

## ***T 5 Forest establishment and reforestation***

### **Introduction**

Information on forest establishment and reforestation is essential to monitor the progress towards sustainable forest management and the global objectives on forests of the United Nations Forum on Forests (UNFF).

### **Special considerations for reporting**

The terms Afforestation and Reforestation refers to the establishment of forest through planting and/or deliberate seeding. The distinction between Afforestation and Reforestation is based on whether the land on which the establishment takes place is classified as forest or not. Re-forestation does not imply any change of land use (e.g. re-establishment of forest), whereas Afforestation implies a change from other land use to forest.

It should be noted that natural regeneration of forest is **only** included in the specific case of natural expansion of forest which implies a change of land use from non-forest to forest.

## **5.4 T 6 Growing stock**

### **Table T6a Growing stock**

#### **Introduction**

The growing stock of Forest and of Other wooded land forms one of the fundamental tables of the FRA 2010 report. Generally the growing stock figures also constitute the basis for the calculation of Biomass and Carbon stocks. This table is closely related to tables 6b, T7 and T8 and it is suggested that the estimations of Growing stock be undertaken first, as this may save time and efforts. The compilation of growing stock by species in table 6b may also facilitate estimating biomass in table T7 as wood densities can vary considerably between individual species.

New in FRA 2010 is the fact that Commercial growing stock has been replaced with Growing stock of commercial species. The reason for this change is that the new variable does not involve any assumptions on areas legally, technically and economically available for wood supply.

#### **Special considerations for reporting**

##### Growing stock

If a country has only partial inventories, a decision has to be made on how the inventory data can be “expanded” to a national estimate. One approach is to divide the total area of Forest and Other wooded land into broad classes of “forest types” or into eco-regions, and then use available inventory data to estimate per-hectare figures of growing stock for each of these broad classes. The totals for each class are then calculated (multiplication with respective area) and added together to obtain the requested estimates for Forest and Other wooded land (see example 7, next page).

In some cases, countries may have inventory data that does not directly include tree volume, but rather basal area or number of trees in different diameter classes. In those cases, countries will need to convert basal area or number of trees to volume. This can be done in several ways depending on the inventory data and any available complementary information, but it is difficult to provide any general guidance on how to perform these conversions. National correspondents must provide a description in the country report on how the calculations of growing stock were made and what volume equations or other factors were used.

In some cases biomass data may be available but no growing stock data. In such cases, growing stock may be estimated from biomass, using the default values for biomass expansion factors and wood densities listed in Appendix 5.

## Example 7. Growing stock estimates when only partial inventory data are available

The following area estimates are available (1000 hectares)

<i>Total Forest area:</i>	10 000
<i>Tropical moist forests:</i>	8 000
<i>Pine plantations</i>	1 500
<i>Eucalyptus plantations:</i>	500
<i>Total Area of OWL</i>	3 500

Inventory data give the following estimates:

<i>Tropical moist forests:</i>	95 m <sup>3</sup> /ha
<i>Pine plantations</i>	130 m <sup>3</sup> /ha
<i>Eucalyptus plantations:</i>	150 m <sup>3</sup> /ha

Furthermore, for Other wooded land there is an expert estimate:

<i>Other wooded land</i>	20 m <sup>3</sup> /ha
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Total growing stock can then be calculated as follows:

$$\begin{aligned} \text{Forest: } & ((95 \times 8000) + (130 \times 1500) + (150 \times 500)) \times 1000 = \mathbf{1\ 030\ million\ m^3} \\ \text{OWL: } & (20 \times 3500) \times 1000 = \mathbf{70\ million\ m^3} \end{aligned}$$

If it is difficult for a country to provide good estimates for Forest and Other wooded land separately, while there are good figures for these two areas together, a country may report for these as a group, as long as this is clearly documented in the country report under “Comments related to data, definitions, etc.”. However, countries are strongly encouraged to use expert estimates for separating growing stock on Forest and Other wooded land.

Whenever possible, the total growing stock should be further divided into “coniferous” and “broadleaved” species based on inventory data or expert estimates.

### Growing stock of commercial species

The Growing stock of commercial species is a sub-set of the total growing stock. In order to calculate the Growing stock of commercial species, the country must select a sub-set of data according to the following:

- Commercial species that are currently being commercialized for domestic and/or international markets.
- Include all trees of commercial species within the threshold limits given for growing stock, regardless whether they have reached commercial dimensions or not and regardless of whether or not they are growing on areas available for wood supply.

Once these selections have been made, inventory data can be used to obtain new estimates. In the case of partial inventories, the same procedure as outlined in the example above can be used.

Apart from these calculations, calibration and estimation/forecasting may also be needed in order to obtain figures for the requested reporting years and consistent with the areas of Forest and Other wooded land reported in table T1. These procedures are described in detail in chapter 4.

### **Table T6b - Growing stock composition**

In this table, countries are requested to report the Growing stock of the ten most common species plus remaining species. Note that the figures in this table only apply to land classified as Forest in table T1.

The reference year for compiling the species list and the order of the species is 2005. The ranking of species is according to volume 2005. The totals of growing stock for year 1990, 2000 and 2005 must match corresponding values for forest Growing stock in table 6a.

Each species should be identified in the reporting table by both *scientific name* and common name. In special cases countries may report on genera instead of species if their inventory data do not allow the distinction of individual species within certain species groups and clearly document this in the relevant field under “Comments related to data, definitions, etc”.

### **Table T6c - Specification of threshold values**

Countries are requested to document the specification of the threshold values that are used for the definition of growing stock. It is very important to report these values as they will be needed in order to harmonize data between countries for global reporting. These values are:

- Minimum diameter at breast height of trees included in growing stock (cm)
- Minimum diameter at the top end of stem for calculation of growing stock (cm)
- Minimum diameter of branches included in growing stock (cm). If branches are NOT included in growing stock, write -1.
- Volume refers to “Above ground” or “Above stump”?

The threshold values applied must be the same for all reporting years.

## **T 7 Biomass stock**

### **Introduction**

The information on biomass stock of Forest and Other wooded land is essential to assess the amount of carbon in the woody vegetation. This information is directly linked to international reporting on greenhouse gases and climate change. The information on biomass stock is also of interest from a wood energy point of view.

This table is closely related to tables T6a, T6b, and T8 and when countries base the estimates of biomass and carbon on growing stock figures, it suggested that tables T6a and T6b are completed first as this will save time and efforts and facilitate consistency between the tables.

For estimations of Biomass and Carbon stocks, the FRA process relies on the methodological framework developed by the IPCC and documented in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4, chapters 2 and 4. This document is available at: <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.htm>. Relevant tables with default values and conversion and expansion factors are presented in Appendix 5.

### **Special considerations for reporting**

#### General methodological aspects

For any biomass calculation, irrespective of whether for Above-ground biomass, Below-ground biomass or Dead wood, the choice of method is determined by available data and country-specific biomass estimation methods. The following list indicates some choices, starting with the method that provides the most precise estimates.

1. If a country has developed biomass functions for directly estimating biomass from forest inventory data or has established country-specific factors for converting growing stock to biomass, using these should be the first choice.
2. The second choice is to use other biomass functions and/or conversion factors that are considered to give better estimates than the default regional/biome-specific conversion factors published by IPCC (e.g. functions and/or factors from neighbouring countries).
3. The third choice is to use the IPCC default factors and values as presented in Appendix 5. These have been improved since the 2003 Good Practice Guidance and are now available for different geographical regions and ecological zones.

**Note that since the default factors and values have improved since FRA 2005, countries should not simply repeat the biomass estimates made for FRA 2005.**

When Biomass is estimated based on Growing stock data, countries should document the methodology and conversion factors used, but the calculations can be simplified by using the estimated Growing stock for the reference years from table T6a (and T6b if applicable) as input. Hence, no further calibration or reclassification is necessary.

## Estimation of Above-ground and Below-ground biomass

If no specific biomass functions are available, the following general formulas should be used for calculating biomass from growing stock figures:

Box 1. Formula for calculating Above-ground and Below-ground biomass

$$\mathbf{AGB} = \mathbf{GS} \times \mathbf{BCEF} \quad (1a)$$

or

$$\mathbf{AGB} = \mathbf{GS} \times \mathbf{WD} \times \mathbf{BEF} \quad (1b)$$
$$\mathbf{BGB} = \mathbf{AGB} \times \mathbf{R} \quad (2)$$

Where:

- AGB** = Above-ground biomass (tonnes)
- BGB** = Below-ground biomass (tonnes)
- GS** = Growing stock (Volume, m<sup>3</sup> over bark)
- WD** = Basic wood density (Dry weight / green volume expressed in tonnes/m<sup>3</sup>)
- BCEF** = Biomass conversion and expansion factor (Above ground biomass / growing stock, (tonnes/m<sup>3</sup>))
- BEF** = Biomass expansion factor (Above ground biomass / stem biomass)
- R** = Root-shoot ratio (Below-ground biomass / Above-ground biomass)

As seen in the Box above, there are two options to calculate Above-ground biomass, either by directly applying biomass conversion and expansion factors (BCEF) to the Growing stock figures or by using basic Wood Density (WD) to estimate stem biomass and then apply a Biomass Expansion Factor (BEF).

The 2006 IPCC guidelines suggest using the BCEF found in Table 5.4<sup>1</sup>. However, countries may also choose to use WD (Tables 5.6 and 5.7) and BEF (Table 5.8) as in FRA 2005. The latter may be particularly useful if the growing stock distribution by species is well known and the basic wood densities of the dominating species are significantly different from the regional average.

Table 5.4 on biomass conversion and expansion factors may require some specific explanation. The entry points are climatic zone, forest type and growing stock level in m<sup>3</sup>/ha. The growing stock per hectare actually refers to stand/compartments stock level, however for most countries such information is not available. Countries should instead estimate (if possible) the Growing stock and area of each forest type and from this calculate an average growing stock per hectare and subsequently determine the BCEF to apply for each forest type.

The BCEFs in table 5.4 is given as an average default value and, within parenthesis, a range. Within this range, lower values apply if Growing stock definition includes branches, stem tops and cull trees; upper values apply if branches and tops are not part of Growing stock, minimum top diameters in the definition of Growing stock are large, inventories volume falls near the lower category limit or basic wood densities are relatively high.

When it is not possible to determine the Growing stock and area by forest type, the National Correspondent must decide which BCEF to apply or, alternatively, use Wood Density and

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<sup>1</sup> The table references in this chapter all refer to Appendix 5.

Biomass Expansion Factors instead. The decision should take into account a rough expert estimate of distribution by forest types and average growing stock per hectare.

Once the Above-ground biomass is estimated, Below-ground biomass can be estimated by multiplying the Above-ground biomass by the Root-shoot ratio (R) (Table 5.6). In this table, the entry points are ecological zone and Above-ground biomass per hectare. Unfortunately, it does not contain the same forest types as the table for BCEF. In the specific case of conifers in tropical and sub-tropical areas, it is recommended to use the entries for conifers in temperate forests.

Example 8. Above-ground and Below-ground biomass calculations. The example refers to tropical forests.

Forest area	(1)	3000	(1000 ha)	from T1 (all forests are broadleaved)
Growing stock	(2)	450	(million m <sup>3</sup> )	from T6
	(3)	150	(m <sup>3</sup> /ha)	(2) / (1) * 1000
BCEF (broadleaved)	(4)	1.3	(tonnes / m <sup>3</sup> )	from table 5.4
Root-shoot ratio	(5)	0.24		from table 5.3
Above-ground biomass	(6)	585	(million tonnes)	(2) * (4)
Below-ground biomass	(7)	140	(million tonnes)	(5) * (6)
Dead wood	(8)	n.a.	(million tonnes)	IPCC default value not available
<b>Total</b>		<b>n.a.</b>	(million tonnes)	(6)+(7)+(8)

Note: Total is listed as “n.a.” as the Dead wood component is unknown.

#### Calculation of dead wood dry matter

If national estimates based on country-specific data and/or conversion factors are available, these estimates should be reported. **If no national data on dead wood biomass are available, countries should report n.a.** In FRA 2005, default factors for dead wood as a percentage of living biomass were used, but in the 2006 IPCC Guidelines these were removed as they were considered to be too weak.

## **T 8 Carbon stock**

### **Introduction**

The information on Carbon stock indicates the contribution of Forest and Other wooded land to the carbon cycle. This information is used by international processes that monitor greenhouse gases and climate change.

This table is closely related to tables T6a, T6b, and T7 and when countries base the estimates of carbon on biomass and growing stock figures, it suggested that tables T6a, T6b and 7 are completed first as this will save time and efforts and facilitate consistency between the tables.

For estimations of Biomass and Carbon stocks, the FRA process relies on the methodological framework developed by the IPCC and documented in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4, chapters 2 and 4. This document is available at: <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.htm>. Relevant tables with default values and conversion and expansion factors are presented in Appendix 5.

### **Special considerations for reporting**

#### General methodological aspects

In most cases the estimation of the Carbon stock of living biomass and Dead wood will be based on the biomass data compiled in table T7. When converting the Biomass stock to Carbon stock the Biomass is multiplied by the carbon fraction. The default global carbon fraction recommended by IPCC is 0.47 (see Appendix 5, Table 5.2).

Note, if national estimates of carbon stock are available and these are considered to be more accurate than those obtained by applying the IPCC default carbon fraction to the biomass figures, the national estimates as well as the methods and conversion factors used should be reported.

#### Carbon in living biomass

If national data on Carbon in living biomass are available, these should be used for reporting. If not, the Carbon stock in living biomass can be estimated by multiplying the IPCC default carbon fraction with the reported values on Above-ground and Below-ground biomass respectively.

#### Carbon in dead wood

If national data on Carbon in dead wood or Dead wood biomass are available, these should be used for reporting. If no national data on Carbon in dead wood or Dead wood biomass are available, countries should report “n.a.”. When converting from Dead wood biomass to Carbon in dead wood, the default global carbon fraction of 0.47 can be used.



### Carbon stock in litter

If national data on Carbon in litter are available, these should be used for reporting. If no national or regional data are available, countries may choose to estimate Carbon in litter by multiplying the IPCC default value per hectare with total area of Forest and Other wooded land respectively (see Appendix 5, table 5.9). Please note, however, that the IPCC default values exclude the fine woody debris which by definition forms part of the litter.

### Soil carbon

If national data on Soil carbon are available, these should be used for reporting. Note that countries should specify the soil depth that is used for the soil carbon stock estimates.

If no national or regional data are available, countries may choose to estimate Soil carbon by multiplying the IPCC default value per hectare with total area (see Appendix 5, table 5.10). If the IPCC default values are used, a soil depth of 30 cm should be reported.

Example 9. Calculation of Carbon stock (The example refers to broadleaved forest in a moist tropical area.)

Forest area	(1)	3000	(1000 ha)	from T1 (all forests are broadleaved)
Above-ground biomass	(2)	585	(million tonnes)	from T7
Below-ground biomass	(3)	140	(million tonnes)	from T7
Carbon fraction	(4)	0.47		from table 5.2
Carbon content in litter	(5)	2.1	(t C ha <sup>-1</sup> )	from table 5.9
Carbon content in soil	(6)	65	(t C ha <sup>-1</sup> )	From table 5.10, assuming LAC soils
Carbon in above-ground biomass	(7)	275	(million tonnes)	(2) * (4)
Carbon in below-ground biomass	(8)	65.8	(million tonnes)	(3) * (4)
Carbon in dead wood	(9)	n.a.	(million tonnes)	IPCC default value not available
Carbon in litter	(10)	6.30	(million tonnes)	(1) * (5) / 1000
Soil carbon	(11)	195	(million tonnes)	(1) * (6) / 1000
<b>Total</b>		<b>n.a.</b>	(million tonnes)	(7)+(8)+(9)+(10)+(11)

Note: Total is listed as "n.a." as the Carbon in dead wood component is unknown.

Countries are encouraged to report on litter and soil when ABG and BGB are reported upon.

## **T 9 Forest fires**

### **Introduction**

In many ecosystems, natural fires are essential to maintain ecosystem dynamics, biodiversity and productivity. But fire can also cause damage to forests, woodlands and other vegetation. Knowledge about the extent, causes and damages caused by fires is important for planning prevention and suppression measures and for monitoring the effect of such measures.

### **Data sources**

National Correspondents are encouraged to look at the FRA 2005 Thematic study on wildland fires. The study is available at <http://www.fao.org/forestry/site/38796/en> .

### **Special considerations for reporting**

Forest fires do not usually follow regular patterns and there may be considerable variations over the years. The countries are therefore requested to report a five-year average for affected area and number of fires (e.g. the figures for the reporting years refer to the averages for the five-year periods: 1988-1992, 1998-2002 and 2003-2007 respectively).

Data reported in table T9a refer to all land area affected by fire, while table T9b only refers to the forest area.

In table T9a, Total area affected by fire is the main estimate and should be supported by national data whenever possible. The further breakdown of the area into Forest, Other wooded land and Other land can be rough expert estimates if no data are available. Likewise, the proportions to be reported in table T9b can be expert estimates if no data are available.

## **T 10 Other disturbances affecting forest health and vitality**

### **Introduction**

Disturbance caused by biotic agents or abiotic factors affect the health and vitality of the forest resources. Information about the type, magnitude and periodicity of such disturbances is essential in order to develop appropriate management regimes to control and mitigate their impact on forest health and vitality.

### **Special considerations for reporting**

#### Table T10a - Disturbances

The reporting table covers four different disturbance categories and the total area affected by these disturbances. The categories are Insects, Diseases, Other biotic agents (such as physical damage caused by animals) and Abiotic factors (such as flooding, wind, drought, etc.). Countries are encouraged to specify any significant disturbances in the comments to the table.

Forest fires should not be accounted for as a disturbance in this table as it is separately reported on in table T9a and T9b, neither should this table include disturbances which are direct results of human activities such as logging damages, over-exploitation, refugee camps, etc.

In some cases, areas have been affected by different disturbances simultaneously, each of which is contributing to reducing the health and vitality of the ecosystem. For example, there are areas affected by storm and then insects, or flooding and then diseases. In such cases the areas should be reported for each relevant disturbance category. The total area affected by disturbances is not necessarily the sum of the individual disturbance categories as these may be partially overlapping.

It may sometimes be difficult to define whether a disturbance should be considered to adversely affect the vigour and productivity of the forest and thus be included in this reporting table. Countries are encouraged to report what criteria they have used for including and/or excluding certain disturbances. However, generally a disturbance should cover an area of at least 0.5 hectares and generate an impact that significantly affects the health and vitality of the forest.

Disturbances do not usually follow regular patterns and there may be considerable variations over the years. The countries are therefore requested to report the annually affected area calculated as a five-year average (e.g. the figures for the reporting years refer to the averages of annually affected areas for the five-year periods 1988-1992, 1998-2002 and 2003-2007 respectively). If availability of national data does not allow calculation of five year averages countries may use fewer years in order to calculate the average but this should be noted in appropriate comment field.

Table T10b – Major outbreaks of insects and diseases affecting forest health and vitality

In this table countries should list the major outbreaks of insects and diseases that have occurred since 1990. Provide the *scientific name* of the agent (insect or disease), the name of tree species or genera affected, the year (or period of years) of the latest outbreak, the total area affected during the latest outbreak and – if the outbreak is of cyclic nature – the approximate interval between outbreaks.

Table T10c – Area of forest affected by woody invasive species

In this table, countries should list the *scientific name* of the five most important woody invasive species that constitute, or are expected to constitute, a problem for forest ecosystem health and vitality.

































































































