Forestry Department
Food and Agriculture Organization of the United Nations

GLOBAL FOREST RESOURCES ASSESSMENT UPDATE 2005

GUIDELINES FOR COUNTRY REPORTING TO FRA 2005

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The Forest Resources Assessment Programme

Forests are crucial for the well being of humanity. They provide foundations for life on earth through ecological functions, by regulating the climate and water resources and by serving as habitats for plants and animals. Forests also furnish a wide range of essential goods such as wood, food, fodder and medicines, in addition to opportunities for recreation, spiritual renewal and other services.

Today, forests are under pressure from increasing demands of land-based products and services, which frequently leads to the conversion or degradation of forests into unsustainable forms of land use. When forests are lost or severely degraded, their capacity to function as regulators of the environment is also lost, increasing flood and erosion hazards, reducing soil fertility and contributing to the loss of plant and animal life. As a result, the sustainable provision of goods and services from forests is jeopardized.

FAO, at the request of the member nations and the world community, regularly monitors the world's forests through the Forest Resources Assessment Programme. The Global Forest Resources Assessment 2000 (FRA 2000) reviewed the forest situation by the end of the millennium. FRA 2000 included country-level information based on existing forest inventory data, regional investigations of land-cover change processes and a number of global studies focusing on the interaction between people and forests. The FRA 2000 Main report is published in print and is available on the World Wide Web.

The Global Forest Resources Assessment update 2005 (FRA 2005) has been requested by the FAO Committee on Forestry in 2003. The FRA 2005 will use common thematic areas of the Criteria for Sustainable Forest Management as a reporting framework. FRA 2005 will also focus on the specific conditions and issues in each country.

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The FRA Working Paper Series provides an important forum for the rapid release of preliminary findings needed for validation and to facilitate the final development of official quality-controlled publications. Should users find any errors in the documents or have comments for improving their quality they should contact fra@fao.org.

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Abbreviations used

AG	Advisory Group to FRA
C&I	Criteria and Indicators (for Sustainable Forest Management)
COFO	Committee on Forestry, the main statutory body of the FAO Forestry Department, meeting every second year in Rome
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	FAO Statistical Databases, see http://faostat.external.fao.org
FRA	The FAO-led Global Forest Resources Assessment
FRA 2000	Global Forest Resources Assessment 2000, see www.fao.org/forestry/fra2000report
FRA 2005	Global Forest Resources Assessment update 2005, see www.fao.org/forestry/fra2005
NC	National Correspondent to FRA
SFM	Sustainable Forest Management
CBD	Convention on Biological Diversity
CSD	United Nations Commission on Sustainable Development
DBH	Diameter at breast height
FORM	Forest Resources Development Service
IPCC	International Panel on Climate Change
ITTO	International Tropical Timber Organization
IUCN	The World Conservation Union
MDG	Millennium Development Goals
MCPFE	Ministerial Conference on Protection of Forests in Europe
NFI	National Forest Inventory
NWFP	Non-wood forest products
OWL	Other wooded land
OLWTC	Other land with tree cover
SOFO	State of the World's Forests (FAO biennial publication)
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
USD	United States Dollar
UNEP-WCMC	World Conservation Monitoring Centre (of UNEP)

1 Introduction

1.1 Background to FRA 2005

Global forest resources assessments have been carried out by FAO since 1947 (FAO, 1948), practically since FAO was formed. The mandate to carry out these assessments stems both from the basic statutes of FAO, and from the decision of the Committee on Forestry (COFO). Global assessment reports have been published at approximately ten year intervals. The latest of these reports, FRA 2000, was published in 2001 (FAO, 2001).

The Global Forest Resources Assessment Update for 2005, or FRA 2005, was requested by COFO 2001 and COFO 2003, where it was recommended that global forest resources assessments should: (a) be carried out at 5 year intervals, (b) be related to international forestry processes and (c) be implemented as a broad based assessment.

The main components of FRA 2005 are outlined below in order to give an overview of the entire process and to put the country reporting in a context. The following milestones are important for FRA 2005:

Milestone	Date	Comment
Global meeting of National Correspondents	Nov 2003	Training of National Correspondents and feedback on draft national reporting tables
Regional meeting of National Correspondents	May – Sep 2004	Review of country reports and technical assistance to National Correspondents
Deadline for country reports	Dec 2004	Country reports delivered to FAO according to specifications
COFO 2005	Mar 2005	Comprehensive progress report expected
UNFF5	May 2005	Comprehensive input on reporting processes expected
FRA 2005 launch	Oct 2005	New global data sets presented

For additional information regarding the Global Forest Resources Assessment Programme of the FAO, please follow the links below:

www.fao.org/forestry/fra Homepage for the Global Forest Resources Assessment
www.fao.org/forestry/fra2005 Homepage for FRA 2005

1.2 Purpose of this report

This document contains guidelines for the National Correspondents (NC) on how to prepare the Country Reports to FRA 2005. It explains both the general methodology that should be applied and gives specific guidance for the completion of each of the 15 reporting tables. Together with the document "Specification of National Reporting Tables", it constitutes the main reference documentation for the FRA 2005 reporting process. Complete country reports for five countries will also be made available on the FRA 2005 website. These pilot reports may serve as examples for the National Correspondents on how the country report should be elaborated.

2 Scope of Country Reporting to FRA 2005

The Global Forest Resources Assessment relies on information provided by the individual 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 national reporting tables.

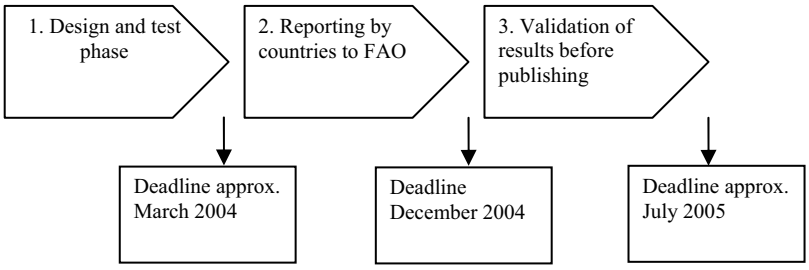
National Correspondents are requested to submit their Country Reports as FRA Working Papers[1] following a standardized format in order to facilitate their preparation and publication. A preformatted FRA Working Paper template to be used for the reporting is included in the documentation provided to the National Correspondents

The Country Reports should be submitted to FAO (preferably by e-mail or on diskette/CD-ROM) before the end of the year 2004. 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. This means that FAO does not require National Correspondents to obtain official approval before submitting the draft report. Country Reports should be written in either English, French or Spanish.

The country report will be divided into two separate parts:

- Standard country reporting. This report should be completed by all countries and follows a set of pre-defined reporting tables. It is of utmost importance to closely follow the specifications and guidelines provided by FAO as this will secure that data are as consistent as possible and follow a standard set of definitions, making it possible to compile information at regional and global level.
- Complementary country reporting by thematic areas. This is a voluntary report containing additional information considered important by individual countries, structured according to seven *common thematic areas* identified by the on-going regional and eco-regional processes on criteria and indicators for sustainable forest management.

The figure below presents the three main phases of the country reporting process and planned target dates. The country reporting process started with a design phase for developing, testing and evaluating the specifications and methodology for country reporting and data processing. The design phase is followed by a reporting, compilation and analytical phase. The third and final phase is the validation and delivery of national assessment reports.



[1] FRA Working Papers is a series of documents elaborated within the FRA programme at FAO. The present document is an example of a FRA Working Paper

3 Methodology for country reporting to FRA 2005

3.1 The process

Validated, transparent and traceable country reports constitute the foundation of FRA 2005. All country information published by FAO should be traceable back to the original national data source. A standard methodology of documentation and reporting has been developed for this purpose.

The compilation of country reports following the proposed standard methodology will guarantee transparency in the reporting process and provide traceability of the country information to be published by FAO. Furthermore, this methodology will facilitate the reporting process and eventually reduce the reporting burden for countries.

The standard methodology for country reporting is a process that consists of three main steps, each of which renders an output that should be included in the country report. The figure below shows the process and the output from each step. Each step is also explained in more detail below.

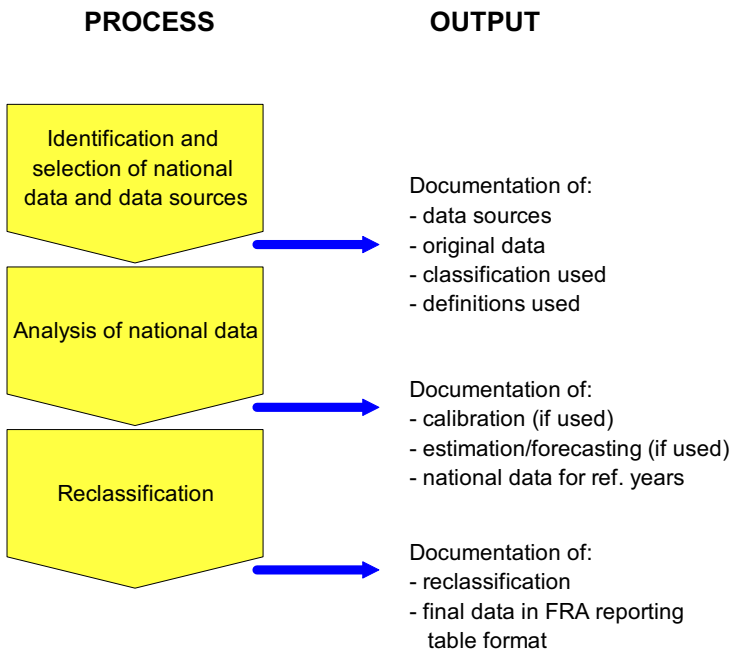


Figure 1. Outline of the standard methodology for country reporting to FRA 2005

Note that for each table, the National Correspondent should go through this process. Sometimes, minor deviations from the standard methodology might be necessary, but in such cases the deviations must be properly documented.

3.2 Step one – Identification and selection of national data sources

Based on the requirements of each specific table for FRA 2005, the country should identify all potentially useful data sources and evaluate the data sources according to content, completeness and quality. In the selection process it is important to choose data sources that use compatible sets of definitions and classification for different years in order to facilitate analysis of trends and estimation/forecasting of figures for the requested reference years. This means that select data sources should, if possible, allow for the establishment of a time series.

Once the selection of data sources has been made, these sources and corresponding data should be documented and included in the country report, following the structure outlined in the Template for Country Reports.

The documentation of each data source should cover at least the following:

- Full reference: Author(s), year of publication (if published), title and publisher.
- Reference year(s) for the data
- Quality assessment, according to the following classes:
  - High quality
  - Medium quality
  - Low quality
- Coverage (complete national coverage or partial coverage)
- Classification and definitions used, related to the particular reporting table

Documentation of national data can be presented in tabular form. Note that only the original data relevant for each specific reporting table and used for the further analysis need to be presented.

It is very important to report also when no data or information are available. More detailed guidelines on how to report when no data are available is found in chapter 4.2.

3.3 Step two – Analysis of National data

This step comprises two steps that may or may not be necessary to carry out, depending on the characteristics of available national data. These include:

- Calibration
- Estimation and forecasting

Calibration is used in order to make sure that reported area and area-related quantitative figures are consistent. For table T1, the total land area of a country report should match the official, reported land area according to FAOSTAT. Hence calibration may be needed in order to make these figures match. Similarly for tables T2 – T4, calibration may be needed to make total area of Forest and Other wooded land match the figures in table T1. For the other tables, calibration may sometimes be needed, particularly in cases when available data are partial or if the country believes that the national data considerably under- or overestimate the real values.

Example of calibration:

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

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
TOTAL land area	**15 000**

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

In order do 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 years 1990 and/or 2000, these data sets can be used directly without any estimation.
- If available data sets do not correspond to the requested reference years, estimation is required.
- Data for 2005 will always be forecasts.
- Forecasts may also be necessary for reference year1990 and/or 2000 if the latest data set is older than the reference year.

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

Example of Estimation using linear interpolation

Original data

	Growing stock (million m^3)	
National class	1988	2001
Forest	500	420
Bushland	300	330

Calculation of differences

Δx (2001-1988)	13	*(time between observations)*
Δy_{forest} (420-500)	-80	*(difference between observed values)*
Δy_{bush} (330-300)	30	*(difference between observed values)*
$\Delta y_{forest} / \Delta x$	-6.1538	*(difference per year)*
$\Delta y_{bush} / \Delta x$	2.3077	*(difference per year)*

Estimations

	Growing stock (million m^3)		
National class	1990	2000	
Forest	487.7	426.2	*(value 1988 + number of years after 1988 x $\Delta y_{forest} / \Delta x$)*
Bushland	304.6	327.7	*(value 1988 + number of years after 1988 x $\Delta y_{bush} / \Delta x$)*

Example of Forecasting using linear extrapolation

Original data

	Growing stock (million m^3)	
National class	1988	1997
Forest	500	460
Other wooded land	300	320

Calculation of differences

Δx (1997-1988)	9	*(time between observations)*
Δy_{forest} (460-500)	-40	*(difference between observed values)*
Δy_{owl} (320-300)	20	*(difference between observed values)*
$\Delta y_{forest} / \Delta x$	-4.4444	*(difference per year)*
$\Delta y_{owl} / \Delta x$	2.2222	*(difference per year)*

Forecasting

	Growing stock (million m^3)		
National class	2000	2005	
Forest	446.7	424.4	*(value 1997 + number of years after 1997 x $\Delta y_{forest} / \Delta x$)*
Other wooded land	326.7	337.8	*(value 1997 + number of years after 1997 x $\Delta y_{owl} / \Delta x$)*

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 must be applied. The NC has to choose a method that is appropriate considering the available data. In case of doubt, contact the FRA team for advice.

It is important to stress that estimation and forecasting is not only a question of making mathematical calculations. It is equally 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.

From this second step, the output to the country report will be the following:

- Under sub-heading Calibration: A description of the calibration applied to data and formula used. If no calibration has been applied, this should be stated. If any other adjustments of original data have been made for the analysis (e.g. harmonization between different data sources), this should also be documented here.
- Under sub-heading Estimation and Forecasting: A description of how and for which years estimation and forecasting have been made or if original data have been used for some of the reference years. The formulas used must be included. This should also include an assessment of the reliability of estimated / forecasted values
- Documentation of national data for the reference years to be used as input for step three.

3.4 Step three – Reclassification of data

In order to make national data fit into the categories defined for FRA 2005, countries may have to reclassify the national data from the reference years. In some cases, 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 apply to each FRA category (see example below)

	FRA category 1	**FRA category 2**	**FRA category 3**	**TOTAL**
National class 1	70%	20%	10%	100%
National class 2	30%	50%	20%	100%

For each reporting table, the NC 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 often a rather subjective assessment, but if there is information available that supports this reclassification it should be documented.

Example of 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

		FRA Categories				
National classes	**1000 ha**	**Forest**	**OWL[1]**	**Other land**	**TOTAL**	**OLWTC[2]**
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%
TOTAL	**30 000**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Result of reclassification

		FRA Categories				
National classes	**1000 ha**	**Forest**	**OWL[1]**	**Other land**	**TOTAL**	**OLWTC[2]**
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
TOTAL	**30 000**	**17 275**	**1 600**	**11 125**	**30 000**	**450**

1) OWL = Other wooded land
2) OLWTC = Other land with tree cover. This is a subcategory of "Other land", hence the percentage given in this reclassification matrix refers to the percentage of the area of "Other land" that has tree cover.

Reclassification should be applied for each reporting year. Many times, the same reclassification matrix can be used for all reporting years, but sometimes it might be necessary to make separate reclassification matrices for different years.

The output from the reclassification constitute the country data for the FRA reference years and categories and should be directly inserted in the relevant table in the country report.

Sometimes, national data from two different sources are using different definitions. In such cases, it may be necessary to perform a harmonization of national data before proceeding with the calculations, so that the national data follow a common standard regarding definitions. In some cases, where there are large differences between definitions in different national data sources, it might be better to reclassify each source directly to the FRA 2005 categories before proceeding with estimation and forecasting. However, this should be seen as an exception from the general rule that national classes should be maintained until the final reclassification step.

4 Guidelines for preparation of the National Reporting Tables

4.1 General aspects

Preparing the National Reporting Tables for FRA 2005 is an important task. 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. The reporting tables for FRA 2005 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 take the necessary steps for getting started with the process as soon as possible in order to not delay the submission of the country report.

4.2 How to report when data are weak or missing

Considering the scope of the national reporting tables, it will frequently happen that national data are either incomplete, weak or missing. The national correspondent has to decide, on a case to case basis, how to handle this, but as a general guidance, the following should be considered.

- Knowing that no national data are available is in itself very important information and should be documented in the country report.

- It is important to fill in all reporting tables even when national data are incomplete or non-existent. Where national data are missing or so weak that they cannot be used for generating requested information, countries may write "Insufficient Data (ID)" in corresponding fields of the reporting table. When Insufficient Data is reported, it should always be accompanied by a footnote that explains in what sense data are insufficient (e.g. missing, weak or incomplete, incompatible definitions, etc.).

- For some of the national reporting tables it is very important to get a complete coverage of country information (e.g. T1 and T5) and for these tables countries should provide their best possible estimate, even if this is a subjective expert estimate.

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 requested information.

4.3 Table T1 – Extent of Forest and Other wooded land

This table is one of the most important tables for FRA 2005. Strong efforts should, therefore, 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.

The FRA 2005 categories for this table are based on both land cover and land use. Countries may need to combine land cover and land use maps in order to provide information for this national reporting table. National forest inventory (NFI) data are good sources of information, if land cover and/or land use have been recorded.

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
- National forest inventories

For each year of available data from selected data sources, the country should report relevant **original** figures from the data source. 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.

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 part of the category "Other land" and its area is thus included in "Other land" and should not be counted double when adding the areas. If countries have weak or missing information on this sub-category, they may choose to report Insufficient Data (ID) with a note that explains in what sense data was considered to be insufficient.

The area estimates for all years should be based on the current borders and area of the country. If borders and country area have changed during the period of reporting, figures should be calibrated to correspond to actual borders and area. If a country did not exist at the time of an earlier reporting year, Not Applicable (NA) should be reported for that year.

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 area of "Forest" and "Other wooded land".

When compiling country data for table T1, it is important that the figure on total area for the country matches with the latest official UN statistics for country area as maintained by FAO (See FAOSTAT, http://faostat.external.fao.org.) Please check the respective area for your country according to FAOSTAT (see Appendix 2) and in case that area figures do not match, perform a calibration as explained in Chapter 3.3. For 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.

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

If available national data do not match with the reference years requested by FRA, it is necessary to perform an estimation / forecasting of data according to the procedure set out in chapter 3.3. See also the example in Appendix 1.

If time series indicate trends that, according to the professional judgment of NC and other specialists taking part of the FRA reporting process, do not reflect the real situation, this must be documented in the country report. If necessary, the country may decide to make an adjustment of the estimated / forecasted data, but if so, this adjustment must be clearly documented and justified in the country report.

4.4 Table T2 – Ownership of Forest and Other wooded land

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

Once the data sources are analyzed and selected, the country should document the existing national data, sources of data and definitions used.

Reclassification

It is important to recall that information on ownership only is requested for land that has been classified as Forest or Other wooded land. If available national data do not provide figures for Forest and Other wooded land respectively, a reclassification must be made.

The reclassification can be done in different ways, depending on available data. To ensure consistency in the country report regarding total area of Forest and Other wooded land, it is recommended to perform a reclassification so that the sum of the percentages for each of these two categories will be 100%. This may, however, result in totals for the ownership categories that do not completely match the original data.

Example: Reclassification of ownership categories

Basic data

Data from Table T1:

Forest	5000
Other wooded land	2000
Other land	6000
Total land area	**13000**
Inland water bodies	1000
Total area for country	**14000**

Figures from register of land titles

Public land	4000
Private land	6000
Land without title	3000
Total land area	**13000**

In the basic data we see that from the total land area of 13000, 5000 is Forest and 2000 is Other wooded land. If the country information don't match area data from table T1, a calibration must be made.

For the following, we assume that no calibration was needed:

Percentages assigned in this example are entirely hypothetical. Note that the sum of the percentages for each row should be 100%

Reclassification matrix

	Public land	Private Land	Other ownersh.	Total
Forest	30%	50%	20%	100%
OWL	10%	75%	15%	100%

Result from reclassification

	Public land	Private Land	Other ownersh.	Total
Forest	1500	2500	1000	**5000**
OWL	200	1500	300	**2000**

Input to National reporting table (assume that example above refers to 1990)

FRA 2005 Categories	Area (1000 hectares)	
	Forest	OWL
	1990	1990
Private ownership	2 500	1 500
Public ownership	1 500	200
Other ownership	1 000	300
TOTAL	**5 000**	**2 000**

If a country reports area figures under the category “other ownership”, the country should specify what kind of ownership applies to this area.

In case it is difficult for a country to give 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. However, this must be clearly documented in the country report.

4.5 Table T3 – Designated functions of Forest and Other wooded land

This table is a complement to table T1, as it further breaks down the areas of Forest and Other wooded land according to their designated function. The term Designated function is defined as "the function or purpose assigned to a piece of land either by legal prescriptions or by the land owner/manager".

Note that for FRA 2005 information is requested for areas with "Primary function" and for "Total area with function". The areas which are recorded as "Primary functions" are exclusive and should only be counted once – consequently the total areas for Forest and Other wooded land should match the respective totals from table T1.

The "Total area with function" should report the total area that has a specific function, regardless of whether it is primary function or not. Areas that have more than one function will consequently be counted once for each function they are designated to provide. For example, the "Total area with function" for the category "conservation" will be calculated by assessing and adding all areas that are designated to provide the function "conservation", independently of whether it is the designated primary function (see further the example below).

The complexity of this table makes it difficult to strictly follow the general methodology as outlined in chapter 3. Particularly, the reclassification is more complex. When applicable, the calibration, estimation and forecasting should be performed before making the reclassification.

When completing the table it is advisable to begin with compiling the area of "Primary function" (steps 1 to 3 in the example below). Normally the process will be carried out in several steps as further explained in the following example:

Example setting
For the example presented below the following information is available:

The total area of Forest and Other wooded land is 31 million hectares of which 25 million is Forest and 6 million hectares Other wooded land.

Of the 31 million hectares of Forest and Other wooded land it is assumed that there is a decree or management plans which stipulates that the primary use of 15 million hectares of Forest and OWL is for production of wood and non-wood forest products. It is further given that the total area of Forest and OWL which is legally protected or allocated in the management plan for protection is 5 million hectares. The remaining balance of 11 million hectares is not covered under legal decrees or management plans.

Example overview
Step 1 – Analysis and reclassification of areas with functions designated by legal or administrative prescriptions (in this example production area and protection area)
Step 2 – Analysis and classification of areas where no function has been designated by legal or administrative prescriptions
Step 3 – Compilation of areas with and without designated functions assigned by legal or administrative prescriptions
Step 4 – Assessment and classification of "Total area with function"
Step 5 – Compilation of total area with function

Note: Compile and report on existing national data

- Perform calibration, estimation and forecasting to reporting years when necessary
- Data for reporting years constitute the input for the following steps
- The steps below need to be repeated for each reporting year

Step 1: Analysis of areas with functions designated by legal or administrative prescriptions:

Let us assume that the production area is comprised of 80% forest and 20% OWL. Similarly, the protected area is comprised of 85% forest and 15% OWL.

Total **production area**	15 million ha.		
...of which forest	80%	or	12 million ha
... of which OWL	20%	or	3 million ha

Total **protected area**	5 million ha.		
... of which Forest	85%	or	4.25 million ha
... of which OWL	15%	or	0.75 million ha

Reclassification to FRA 2005 categories for "Primary designated function"

	Production		**Protected areas**	
	Forest	**OWL**	**Forest**	**OWL**
Area (1 000 ha)	12 000	3 000	4 250	750
Production	100%	100%		
Protection of soil and water [1]			20%	40%
Conservation of biodiversity [1]			80%	60%
Social services				
Multiple purpose				
No or unknown designation				
Total	100%	100%	100%	100%

[1]The reclassification percentages assigned in this example are based on expert knowledge

The reclassification results in the following areas for "Primary designated functions"

	Production		**Protected areas**	
	Forest	**OWL**	**Forest**	**OWL**
Area (1 000 ha)	12 000	3 000	4 250	750
Production	12 000	3 000		
Protection of soil and water			850	300
Conservation of biodiversity			3 400	450
Social services				
Multiple purpose				
No or unknown designation				
Total	12 000	3 000	4 250	750

Step 2: Analysis of areas without a prescribed designated function

a) Total area of Forest without a prescribed designated function

Based on step one, the total area of Forest without prescribed designated function is 16.25 million hectares (12 mil. ha. Forest production area + 4.25 mil. ha. Forest protected area). The area of Forest where no function has been designated by legal or administrative prescriptions thus equals the total area of Forest[1] minus area designated with legal or administrative prescriptions.

In this example the area of Forest[1] is 25 mil. ha., the Forest area without any prescribed designated function is thus 8.75 mil. Ha. (25-16.25).

Assessment/classification of Forest area without any prescribed designated function

Primary designated function	Assessed percentage[2]	Area (1000 ha)
Production	10%	875
Protection of soil and water	5%	437.5
Conservation of biodiversity	5%	437.5
Social Services	0	0
Multiple purpose	40%	3 500
No or unknown designation	40%	3 500
Total	100%	8 750

b) Total area of OWL without a prescribed designated function

Based on step one, the total area of OWL without a prescribed designated function is 3.75 million hectares (3 mil. ha. OWL production area + 0.75 mil. ha. OWL protected area). The area of OWL where no function has been designated by legal or administrative prescriptions thus equals the total area of OWL[1] minus area designated with legal or administrative prescriptions.

In this example the area of OWL[1] is 6 mil. ha. The OWL area without any prescribed designated function is thus 2.25 mil. Ha. (6-3.75).

Assessment/classification of OWL area without any prescribed designated function

Primary designated function	Assessed percentage[2]	Area (1000 ha)
Production	10%	225
Protection of soil and water	0	0
Conservation of biodiversity	0	0
Social Services	10%	225
Multiple purpose	50%	1125
No or unknown designation	30%	675
Total	100%	2250

[1] Total Forest and OWL area should correspond with the figures given in National reporting table T1: Extent of Forest and Other wooded land

[2] In this example the assessed percentage of the total area without any prescribed designated function is based on expert knowledge.

Step 3 – Compile "Primary function" for the national reporting table by *adding partial results* from steps 1 and 2 above.

	Forest			OWL		
Primary function	Leg./Adm. designated	Not leg/adm. designated	**Total area**	Leg./Adm. designated	Not leg/adm. designated	**Total area**
Production	12 000	875	**12 875**	3 000	225	**3 225**
Prot. of soil and water	850	437.5	**1 287.5**	300		**300**
Cons. of biodiversity	3 400	437.5	**3 837.5**	450		**450**
Social services		0	**0**		225	**225**
Multiple purpose		3 500	**3 500**		1 125	**1 125**
No/unknown designat.		3 500	**3 500**		675	**675**
Total	16 250	8 750	**25 000**	3 750	2 250	**6 000**

The figures in bold are transferred to table T3 (if corresponding to the reference year).

Step 4 – Assess "Total area with function"

First, estimate for each total area of Primary function (output step 3), the percentage of the area that is designated to serve other functions than the one listed as the Primary function. This exercise will often be a subjective assessment.

For example, in the first row of the following table, estimations are made for the area where "Production" has been designated to be the primary function. The function "Production" covers of course 100% of this area but in addition about 20% of the area is also designated to provide "Protection of soil and water", 30% of the area is also designated to provide "Conservation of biodiversity" and 30% of the area is also designated to serve the purpose of "Social services".

a) Forest

Primary function	**Area (1000 ha)**	**Percentage of area serving other functions**			
		Prod.	Prot.	Cons.	Soc. serv.
Production	**12 875**	***100%***	20%	30%	30%
Prot. of soil and water	**1 287.5**		***100%***	60%	20%
Cons. of biodiversity	**3 837.5**		25%	***100%***	30%
Social services	**0**				***100%***
Multiple purpose	**3 500**	100%	100%	100%	50%

Note that the **primary designated function** by default is ***100%***.

b) Other wooded land

Primary function	**Area (1000 ha)**	**Percentage of area serving other functions**			
		Prod.	Prot.	Cons.	Soc. serv.
Production	**3 225**	***100%***	10%	10%	50%
Prot. of soil and water	**300**		***100%***	50%	30%
Cons. of biodiversity	**450**		5%	***100%***	30%
Social services	**225**	40%		50%	***100%***
Multiple purpose	**1 125**	100%	30%	40%	40%

The estimated percentages in the above examples are based on expert knowledge.

Step 5 – Compile "Total area with function" for national reporting table T 3

The "total area with function" is calculated separately for Forest and OWL. The area is calculated by multiplying the total area of primary function (step 3) with the percentage of the specific function (step 4) that it is designated to provide. The product is then added for each specific function, for Forest and OWL respectively.

Detailed example of compilation of total Forest area with function "Production"

Primary function	Area Forest (1000ha)[1]	Production[2]	
Production	12 875	***100%***	12 875
Protection of soil and water	1 287.5		
Conservation of biodiversity	3 837.5		
Social Services	0		
Multiple purpose	3 500	100%	3 500
			16 375

[1] Area total with primary designated function (step 3)
[2] Percentage of the area with primary function (step 4) which also is designated to serve a production function

Total area with Production function

Designated function	**Total area with function Forest**	**OWL**
Production	**16 375**	4 440
Protection of soil and water	8 321.9	983
Conservation of biodiversity	11 972.5	1 485
Social services	8 771.3	2 513

4.6 Table T4 – Characteristics of Forest and Other wooded land

Table T4 intends to characterize the structure and composition of forest ecosystems and the degree of human impact on these. The division into different categories of characteristics involves a number of criteria, like visibility of human activities, presence of native and/or introduced species, regeneration methods, etc.

In the following figure, a matrix is presented to serve as reference for the classification used for FRA 2005. Some exceptions may occur as explained below the figure.

Human impact	*No / Very little*	*Yes*	*Yes*
Regeneration	*Natural regeneration*	*Natural regeneration*	*Assisted natural reg. / planting / seeding*
Native species	Primary	Modified Natural	Semi-Natural
Introduced species		Semi-Natural	Plantation

Native species

In the case of native species, the distinction between "Primary" and "Modified natural" 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.

The distinction between "Modified natural" and "Semi-natural" is based on the regeneration method. If the forest/OWL is established by natural regeneration, or if it is not possible to tell whether it was assisted/planted/seeded, it should be classified as "Modified natural". If it is clearly visible that the land was regenerated through assisted natural regeneration (soil treatment or planting/seeding) then it should be classified as "Semi-natural".

Planted areas of native species, here listed as Semi-natural, may also in some circumstances be classified as "Plantations". Such planted areas must then be characterized by even-aged stands of few species planted in a regular pattern. If countries decide to include areas with planted/seeded native species under "Plantations", the criteria used to distinguish these areas from "Semi-natural" must be clearly documented.

Introduced species

In the case of introduced species, the general classification is as "Plantation". However, if there are species that were introduced a long time ago, and there are stands of these species of subsequent generations that were naturally regenerated, these can be classified as "Semi-natural".

For plantations, countries should also report on the type of plantations (productive or protective) depending on the purpose of these.

4.7 Table T5 – Growing stock

The growing stock is one of the basic and very important tables of the FRA 2005 report. In most cases it also constitutes the basis for the calculation of biomass and carbon stocks. Table T5 is closely related to tables T6, T7 and T10 and it is recommended that the estimations of growing stock needed for all these tables be undertaken simultaneously, as this may save time and efforts. By starting to compile information on growing stock by species, it will be easier to estimate biomass for table T6 as wood densities vary considerably between individual species. The information needed for T10 on the composition of growing stock will also come out directly when growing stock is compiled species-wise.

Data sources for growing stock estimates are usually forest inventories. Sometimes data from national forest inventories are available, but frequently inventory data do not completely represent the total area of forest and other wooded land respectively.

After selecting the data sources, countries should present the national data that constitute the basis for the estimates in table T5. Countries should clearly describe the national definition of growing stock and how it has been calculated, and also the geographical coverage of national data and how well the information represents the total area of forest and other wooded land.

Calculation of total growing stock

If a country has a national forest inventory, it should be possible to estimate the growing stock directly from the inventory data. This is the preferred method whenever possible.

If a country has only partial inventories, a decision has to be made on how the inventory data can be “expanded” to national estimates. 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 and added together to obtain the requested estimates for Forest and Other wooded land (see example below).

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. If in doubt, please contact the FRA team for advice. 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.

Example: Growing stock estimates when only partial inventory data are available

The following area estimates are available (1000 hectares)

Total Forest area:	*10 000*
Tropical moist forests:	*8 000*
Pine plantations	*1 500*
Eucalyptus plantations:	*500*
Total Area of OWL	*3 500*

Inventory data give the following estimates:

Tropical moist forests:	*95 m3/ha*
Pine plantations	*130 m3/ha*
Eucalyptus plantations:	*150 m3/ha*
Other wooded land	*20 m3/ha*

Total growing stock can then be calculated as follows:

Forest: ((95 × 8000) + (130 × 1500) + (150 × 500)) × 1000 = **1 030 million m^3.**
OWL: (20 × 3500) × 1000 = **70 million m^3**

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.

Calculation of commercial growing stock

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

- Include only the areas where removal of wood is permitted and economically feasible
- Include only the commercial and potentially commercial species for domestic and international markets, given the current market conditions
- Include only the trees above the minimum diameter at breast height (DBH) for commercial trees, as defined by the country.

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 3.

Finally, countries are requested to present some country-specific values as an appendix to the national reporting tables. It is very important to report these values as they are 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)
- Minimum diameter at breast height of trees included in commercial growing stock (cm)
- Volume refers to “Above ground” or “Above stump”?
- Have any of the above thresholds changed since 1990 (yes/no), and if yes, then attach a separate note giving details of the change

4.8 Table T6 – Biomass stock

FRA 2005 and IPCC Good Practice Guidance

Data on biomass stock of Forest and Other wooded land are included in FRA 2005 since they respond to international reporting requirements for the climate convention and the Kyoto protocol, as well as for development of national policies.

For estimations of biomass and carbon, the FRA 2005 process relies on the methodological framework developed by the IPCC and documented in the *Good Practice Guidance for Land Use, Land-Use Change and Forestry* that will be published by IPCC during 2004. The methods described here and the default conversion factors for biomass and carbon as presented in tables in Appendix 5 are all based on the *Good Practice Guidanc*e. What is presented in this document for tables T6 and T7 is only a summary of those parts of the *Good Practice Guidance* that are relevant to FRA 2005.

Methodological aspects

For biomass calculation, irrespective of whether for above-ground biomass, below-ground biomass or dead wood biomass, there is a choice between the following different methods:

1. If national biomass functions and/or country-specific values of wood density (WD)[2], biomass expansion factors (BEF) and root-shoot biomass ratio (R) are available, using these should be the first choice
2. If country-specific biomass functions or values of any or all of WD, BEF and R are not available, regional or sub-regional functions or conversion factors should be used whenever available.
3. If neither country-specific, nor regional or sub-regional functions or values of WD, BEF and/or R are available, then the default values provided by the IPCC-GPG and reproduced in Appendix 5, tables 5.2 – 5.5 should be used.

If national biomass data are available directly from recent forest inventories, the data should be documented in the country report, and the standard procedure as described in chapter 3 should be followed.

When biomass is estimated based on growing stock data, countries should document the conversion factors used (WD, BEF, R), but the calculations can be simplified by using the estimated growing stock for the reference years from table T5 as input. Hence, no further calibration or reclassification is necessary.

[2] Wood density used for biomass calculations should always be the "Basic density", which is oven-dry weight per unit of green volume. If country-specific wood densities are used, the country must make sure that these are "basic densities".

Calculation of living biomass with general formulas and conversion factors

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

$$SB = GS \times WD \quad (1)$$
$$AGB = SB \times BEF \quad (2)$$
$$BGB = AGB \times R \quad (3)$$

Where

- SB = Stem biomass (tonnes)
- GS = Growing stock (volume) over bark (m3)
- WD = Wood Density (Dry weight / green volume expressed in tonnes/m3)
- AGB = Above-ground biomass (tones)
- BGB = Below-ground biomass (tonnes)
- BEF = Biomass expansion factor (Above ground biomass / stem biomass)
- R = Root-shoot ratio (Below-ground biomass / Above-ground biomass)

The starting point for the calculations is a list of growing stock (volume over bark) for individual species/species groups. This should be taken from the same set of national data as used for tables T5 and T10. Note that the sum of growing stock for all species should match the total growing stock in table T5.

The first step is to calculate the stem biomass. This is done by applying species-wise wood densities. If no national or local data on wood densities are available, default wood densities according to Tables 5.2 and 5.3 in Appendix 5 should be used (see example 1 below).

The second step is to calculate above-ground biomass. This is done by multiplying stem biomass with a biomass expansion factor (BEF). If no national or local data on biomass expansion factors are available, the default biomass expansion factors according to Table 5.4 in Appendix 5 should be used (see example 1 below).

The third step is to calculate below-ground biomass, multiplying the above-ground biomass by the root-shoot ratio. If no national or local data on root-shoot ratios are available, the default root-shoot ratios according to Table 5.5 in Appendix 5 can be used (see example 1 below).

Example 1: Calculation of living biomass

	Growing stock (million m^3)	Basic density (tonnes/m3)	Stem biomass (million tonnes)	Biomass Exp.Fact	A.G biomass (million tonnes)	Root-Shoot Ratio	B.G biomass (million tonnes)
Species 1	500.00	0.45	225.00	1.35	303.75	0.35	106.31
Species 2	300.00	0.62	186.00	1.35	251.10	0.35	87.89
Species 3	200.00	0.55	110.00	1.22	134.20	0.35	46.97
Species 4	50.00	0.40	20.00	1.45	29.00	0.25	7.25
Species 5	30.00	0.51	15.30	1.35	20.66	0.35	7.23
TOTAL	**1 080.00**		**556.30**		**738.71**		**255.65**

Calculation of dead wood biomass

If the country has estimates of dead wood biomass based on country-specific data and/or conversion factors, these estimates should be reported. If no national data on dead wood biomass are available, countries may choose to either use the conversion factors provided by IPCC (Appendix 5, table 5.6) or to report Insufficient Data (ID) for dead wood biomass in the National Reporting Table. Note that the conversions factors provided by IPCC – dead-live ratios - are considered by IPCC to be very weak and they do not recommend to use them generally as default factors.

Biomass calculations for more than one year using weighted conversion factors

Like other data, biomass figures should be reported for 1990, 2000 and 2005. However, where the species composition of the growing stock has not changed significantly over the last 15 years, much time and effort can be saved by completing the species-wise calculation for one year, as indicated in the example above, and then calculate the weighted conversion factors for biomass as follows

$$WCF_{agb} = AGB / GS$$
$$WCF_{bgb} = BGB / GS$$

Where WCF_{agb} = weighted conversion factor for above-ground biomass
WCF_{bgb} = weighted conversion factor for below-ground biomass
GS = Growing stock (volume) of all species
AGB = Above-ground biomass stock of all species
BGB = Below-ground biomass stock of all species

These weighted conversion factors can then be applied directly to the total growing stock figures for the other reporting years as follows:

$$AGB_y = GS_y \times WCF_{agb}$$
$$BGB_y = GS_y \times WCF_{bgb}$$

Where GS_y = Total growing stock for year y
AGB_y = Total above-ground biomass for year y
BGB_y = Total below-ground biomass for year y

Note that the calculations must be made separately for Forest and Other wooded land as species composition is different.

The countries should also document the threshold values used for fine roots and dead wood. If no specific threshold values have been defined (as when countries use the default conversion factors), the default values of 2 mm for fine roots and 10 cm for dead wood should be used.

Example 2: Using weighted conversion factors to calculate biomass for several years

Suppose that the figures from the table in the example above represent year 2000, and we have the following information from table T5:

FRA 2005 category	Volume (million m3 over bark)		
	Forest		
	1990	2000	2005
Growing Stock	1 200	1 080	1 020

First calculate the weighted conversion factors from the table in Example 1 above:

WCF_{agb} = AGB / GS = 738.71 / 1080 = 0.684
WCF_{bgb} = BGB / GS = 255.65 / 1080 = 0.237

Then apply these factors to the growing stock figures for 1990 and 2005 respectively

AGB_{1990} = 1200 × 0.684 = 820.78
BGB_{1990} = 1200 × 0.237 = 284.05

AGB_{2005} = 1020 × 0.684 = 697.67
BGB_{2005} = 1020 × 0.237 = 241.44

...and complete the national reporting table

FRA 2005 category	Biomass (million tonnes oven-dry weight)		
	Forest		
	1990	2000	2005
Above-ground biomass	820.8	738.7	697.7
Below-ground biomass	284.1	255.7	241.4
Total living biomass	**1 104.8**	**994.4**	**939.1**
Dead wood biomass [1)]	121.5	109.4	103.3
TOTAL	**1 226.4**	**1 103.7**	**1 042.4**

[1)] Dead wood calculated by using dead-live ratios (Appendix 5, Table 5.6)

4.9 Table T7 – Carbon stock

General methodological aspects

Carbon stock, like biomass stock, is estimated using the methodological framework provided by the IPCC Good Practice Guidance as explained in chapter 4.8.

The calculation of carbon stock will in most cases be based directly on the biomass data presented in table T6. However, if a country has made estimations of the carbon stock using other methods and obtained national data that provides more accurate estimates than by using the default conversion factors, these estimates as well as the methods and conversion factors used should be reported.

The following text and example illustrate the methodology of calculating carbon stock based on biomass data from table T6, using the default conversion factors and values provided by the IPCC-Good Practice Guidance (see Appendix 5, tables 5.7 and 5.8).

Carbon in living biomass

If national data on carbon content of living biomass are available, these should be used. If not, the carbon stock is calculated by multiplying the IPCC-GPG default value for carbon content of living biomass (50%) with the above-ground biomass and below-ground biomass respectively.

Carbon in dead wood

If data on dead wood biomass are available, the carbon stock can be calculated by multiplying the dead wood biomass with the IPCC-GPG default value for carbon content (50%); however national carbon content values should be used whenever possible. If a country has no data on dead wood biomass and carbon content, it may choose to either use the default factors provided by IPCC (Appendix 5, table 5.6) or report Insufficient Data (ID).

Carbon stock in litter

If national or regional data on carbon in litter are available, these should be reported. If no national or regional data are available, countries may choose to estimate carbon in litter by multiplying the IPCC-GPG default value per hectare with total area (see Appendix 5, table 5.7) or report Insufficient Data (ID).

Soil carbon

If national or regional data on soil carbon are available, these should be reported. Note that countries have to specify the soil depth that has been 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-GPG default value per hectare with total area (see Appendix 5, table 5.8) or report Insufficient Data (ID). If the IPCC-GPG default values are used, a soil depth of 30 cm should be reported.

Example: Calculation of Carbon Stock using the IPCC-GPG default factors.

In this example, data for biomass stock from Table T6 are used

FRA 2005 category	Biomass (million tonnes oven-dry weight)		
	Forest		
	1990	2000	2005
Above-ground biomass	820.8	738.7	697.7
Below-ground biomass	284.1	255.7	241.4
Total living biomass	**1 104.8**	**994.4**	**939.1**
Dead wood biomass [1)]	121.5	109.4	103.3
TOTAL	**1 226.4**	**1 103.7**	**1 042.4**

[1)] Dead wood calculated by using dead-live ratios (Appendix 5, Table 5.6)

Carbon stock of biomass for year 1990 can then be calculated as follows:

Carbon stock of above-ground biomass = 820.8 × 50% = 410.4 million tonnes
Carbon stock of below-ground biomass = 284.1 × 50% = 142.05 million tonnes
Carbon stock of dead wood biomass: = 121.5 × 50% = 60.75 million tonnes

Furthermore, assume that the country in this example is located in the Tropical moist zone with evergreen forests and with the following soil conditions of the Forest area.

Forest	Area (1000 hectares)		
	1990	2000	2005
HAC soils	8 000	7 700	7 500
LAC soils	4 000	3 800	3 700
Sandy soils	3 000	3 000	2 800
Total	**15 000**	**14 500**	**14 000**

Carbon content of litter and soil can be found in the Appendix 5, tables 5.7 and 5.8 and are as follows for the above conditions:

Soil carbon content, HAC soils	65 tonnes C per ha
Soil carbon content, LAC soils	47 tonnes C per ha
Soil carbon content, Sandy soils	39 tonnes C per ha
Litter carbon content	5.2 tonnes C per ha

Litter carbon for year 1990 can then be calculated as 5.2 × 15000 / 1000 = 78 million tonnes

Soil carbon must be calculated separately for each soil type, and for year 1990 will be:
[(8000 × 65) + (4000 × 47) + (3000 × 39)] × 1000 = 825 million tonnes

This calculation must be repeated for each reporting year and also separately for Other wooded land.

4.10 Table T8 - Disturbances affecting health and vitality

Table T8 aims at providing information on areas affected by disturbances that have an impact on the health, vitality and productive capacity of Forest and Other wooded land. Three main categories are defined: areas disturbed by fire, by insects and by pests. There is also a category for "Other disturbances" where countries may report areas affected by drought, flooding, wind, acid rain, etc. If a country reports areas under "Other disturbances" the type(s) of disturbance should be specified in the report.

As these kinds of disturbances usually do not follow any regular pattern, there may be considerable variations over the years. The countries are therefore requested to report the annually affected area calculated as a 5-year average.

It may often be difficult to define whether a disturbance should be considered to have a significant impact on the health, vitality and/or productive capacity and thus be included in the reporting for table T8. Countries should be aware of this and report what criteria they have used for including and/or excluding certain disturbances.

In some cases, areas have been affected by different disturbances simultaneously, each of which is contributing to reduce the health and vitality of the ecosystem. For example there are areas affected by storm and insects, or flooding and diseases. In such cases the areas should be reported for each relevant disturbance, not only the dominating one. This implies that there is no reason to sum the areas in the reporting table.

As stated in the specification to the table, 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 in order to be included.

The data sources and availability of data for this table may vary between countries. If there are data available, although only partial, these data should be used as far as possible in order to provide the requested information. However, there will still be many countries where no information is available for any of the disturbance categories. In such cases, countries should report "Insufficient data"(ID).

4.11 Table T9 – Diversity of tree species

Table T9 on tree species diversity aims at giving an indicator of the biodiversity of the country and also to specify the number of tree species included in the IUCN red list of endangered species. Note that this table only requests data for year 2000.

First, the total number of identified native tree species should be reported. In countries with a large number of tree species, it will be necessary to collaborate with botanical institutions in order to obtain this number.

In this context it is important to emphasize the definition of the term "Tree". For the FRA reporting, a tree is considered to be "**a woody perennial with a single maim stem, or in the case of coppice with several stems, having a more or less definite crown".** Bamboo's and palms meeting these criteria are also considered as Trees. A tree should under normal conditions be able to reach the height of 5 m at maturity *in situ*, although this limit must be interpreted with flexibility.

Second, the number and a list of tree species included in the IUCN red list of endangered species should be reported for the following three categories:

- Critically endangered tree species
- Endangered tree species
- Vulnerable tree species

These categories (and some additional categories) were adopted by IUCN in 1994 and have since then become an internationally recognized standard for classifying endangered species. More information on the IUCN categories and their exact definitions can be found at the following website:

http://www.redlist.org/info/categories_criteria2001.html

Where national red lists are lacking or difficult to access, country-specific lists of endangered plants and animals can be accessed through the FRA website at the following address:[3]

http://www.fao.org/forestry/site/20747/en

Opening this website, the first thing to do is to select the country for which the species lists are to be compiled. Next, select "Critically endangered" in the menu to the left. In the window to the right will appear a list of species or a message that "No results were found." Print and/or save the list and proceed to the "Endangered" and finally to the "Vulnerable". Note that by using the categories under the heading "Redlist species – PLANTAE" you will restrict the search to plants and consequently get fewer species in the list. If you select the categories under the heading "Redlist species – All" the resulting list will also contain animals.

[3] If there are any problems to compile the country specific lists from the indicated website, please contact the FRA team in order to get a hardcopy.

The lists compiled on this website include all plants. For the purpose of FRA 2005, countries should extract and compile a list of the tree species for each of the three reporting categories, to be included as an Appendix to the country report.

In the rightmost column of the list is an indication of the year when the species was included in the red list. Only species included before and up to year 2000 should be included in the report for FRA 2005.

Another data source for the number of redlisted tree species is the database of the World Conservation Monitoring Centre. Here, the number of tree species according to the IUCN categories are presented country-wise. No list of species names are currently available. This information is available at the UNEP-WCMC website:

http://www.unep-wcmc.org/trees/Background/country_stats.htm

4.12 Table T10 – Growing stock composition

In this table, countries are requested to report the growing stock of the ten most common species, regardless of their commercial status. This table should preferably be elaborated together with table T5 on growing stock.

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 year 2000. For comparison and trends, the values of growing stock for year 1990 should also be estimated. The totals of growing stock for year 1990 and 2000 should match corresponding values for forest in table T5.

Each species should be identified in the reporting table by both scientific name and common name. Countries may report on genera instead of species if their inventory data do not allow the distinction of individual species within certain species groups.

4.13 Table T11 – Wood removal

Table T11 deals with wood removal. Removal should not be confused with "consumption" or "harvesting / felling". The consumption refers to national domestic production plus net imports and less exports. Harvesting/felling is the national production plus the quantity of the product left in the forest. The wood is considered to be removed when it leaves the forest, so wood harvested and stored on landings in the forest should not be considered as removed until it leaves the landing.

Note that wood removed during one year may originate from trees felled during several years and that the figures on wood removal requested for this table refer to volume over bark.

The reported figures for 1990 and 2000 should be based on an average of a five year period in order to take the annual variations into account. The figure for reference year 1990 will thus be based on the average of 1988 to 1992, and so on. If data are not available to produce five year averages for the reference year this should be documented along with information on how the value for the reference 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 (see section 3.3)

The value for reference year 2005 will be based on forecasting and will therefore not represent a five-year average. Values for the reference years 1990 and/or 2000 may also be based on forecasting if the most recent data are older than the reference year.

To estimate wood removal, there are two basic options. Each country should choose the option that their national experts consider will provide the most reliable estimates.

- Base the estimate on figures on wood removal already reported to international organizations (see e.g. Appendix 3).

- Direct estimation based on available national data, following the general methodology as outlined in chapter 3.

In any case, underlying national data should be documented and presented. That means that where data on wood removal were taken from Appendix 3, countries should report the national data that constituted the basis for the original report to FAO or ITTO.

Estimate wood removal from annual reports to international organizations

FAO, ITTO and EUROSTAT have during the last decades compiled annual statistics on wood removal. During the last five years, these institutions have distributed a Joint Forest Sector Questionnaire (JFSQ) where, among other things, countries are requested to report on wood removal. FAO maintains a global database on forest production, and here all the information on wood removal that countries historically have submitted can be found. Information on wood removal reported to FAO can be found in Appendix 3, where table 3.1 refers to removal of industrial wood and table 3.2 refers to removal of woodfuel.

In order to use the historically reported figures on wood removal as the basis for making the estimates for table T11, it should be kept in mind that there are two fundamental differences between what is to be reported to FRA 2005 and what countries are reporting for the JFSQ.

- FRA 2005 requests information on wood removal as volume over bark while the JFSQ and corresponding figures in Appendix 3 refer to volume under bark.
- FRA 2005 aims at identifying the long term trends and therefore asks for data as five-year averages, while the JFSQ requests annual data.

In order to use data from Appendix 3 to make estimations for table T11, the figures must be converted from volume under bark to volume over bark. This is done by applying a bark factor. Due to considerable regional variations, it is recommended that countries establish national bark factors and use these for the calculations. If no national bark factor can be established, a global default conversion factor of 1.15 can be used as a last resort for converting volume under bark to volume over bark (Source: IPCC Good Practice Guidance).

Making new estimates of wood removal from national data

If a country chooses to make new estimates, the general methodology as described in chapter 3 should be applied. The reason why earlier reported data are not used should then be explained.

National data sources are likely to include- (but not restricted to) any the following:

1. National forestry statistics
2. Trade statistics
3. Transport statistics
4. Statistics on wood consumption
    - In some countries where no or limited woodfuel data is available and woodfuel for subsistence represents a major wood removal component, the removal can be estimated on basis of population and studies on woodfuel consumption per capita.
    - Estimations can also be made by converting the volume of products produced in the country to the volume of roundwood required to produce that volume (the roundwood equivalent). (Source: FAO forestry statistics Series 171, FAO, 2001).

If needed, comment on units of reporting. The units of reporting must be comparable between reporting years. When conversion factors are used, these must be documented in the country report. Some conversion factors are listed in Appendix 5, table 5.1.

Example:

1. National statistics may give woodfuel figures in tonnes; the conversion factor from tonnes to round wood cubic meters should be documented. E.g. 1 metric ton woodfuel = 1.37931 cubic meter round wood. (Source: FAO forestry statistics Series 171, FAO 2001).
2. The volume of roundwood used in charcoal production, can be estimated by using a factor of 6.0 to convert from the weight (MT) of charcoal produced to the solid volume m^3 of roundwood used in production (gives figure under bark). (Source FAO forestry series 171, FAO 2001). For further forest product measures etc., see Appendix 5, table 5.1

The unit of the final output (data for national reporting tables) for this table is wood removal in thousands of m^3 round wood o.b. (measured over bark). It is important to document any conversion factors that have been used to convert any used national units to m^3 round wood o.b.

Calibration may not be necessary unless only partial data are available and/or if there are apparent and documented reasons to believe that available data seriously over- or underestimate the "real" values and thus need calibration.

When national data are not directly available for the FRA 2005 categories, a reclassification is necessary. Below is an example of a reclassification matrix: Indicate the rationale behind the assignment of reclassification percentages.

	Industrial Roundwood	*Woodfuel*	*TOTAL*
National class 1			*100%*
National class 2			*100%*
and so on…			*100%*

This step is not necessary if national data are directly compatible with the FRA 2005 categories.

4.14 Table T12 – Value of wood removal

Table T12 is closely related to T11 and aims at showing the economic value of the removed wood.

Note that the value requested for this table should correspond to the market value of the wood at the border of the forest when it is at a roadside landing, loaded on a truck for road transport, or otherwise ready to be transported away from the forest.

The value should be reported in USD using the actual exchange rate for the reference year of the data. In Appendix 4 there is a list of historical exchange rates for most national currencies related to USD. The reported value should exclude taxes.

One method to estimate the value of wood removal, is to estimate a per unit value for industrial round wood and woodfuel and then multiply this value with the respective quantity as reported in table T11. In order to make this estimate, countries should be aware of the following:

- Each category (industrial roundwood and woodfuel) may be composed of different species or types of raw material that have different market values. In such a case, a weighted average value for the whole category must be estimated

- If there is no good information on market value at the border of the forest, a market value can usually be established further down the production chain (at industry gate, at consumer centres, etc.). In this case, transport costs from the forest to the place where the market value is assessed should be deducted. If any further processing has taken place before the value is assessed, processing costs should be deducted and necessary conversions must be made in order to account for processing losses.

- The assessment should also include wood that is removed for subsistence use with the value calculated on the basis of local market prices.

4.15 Table T13 – Non-wood forest products removal

Forests and other wooded lands provide a variety of products other than wood. These non-wood forest products are both socially and economically important. However, data on quantity and value of these products are often difficult to find.

The FRA 2005 report will include global statistics on production and value of non-wood forest products if sufficient information is available. In table T13 countries are therefore requested to provide information on the quantities of non-wood forest products removed, grouped in a number of categories (see table below). The reported figures should cover all removals, both for commercial and for non-commercial use.

Category	**Reporting unit**
Plant products / raw material	
1. Food	Mass (tonnes or kg)
2. Fodder	Mass (tonnes or kg)
3. Raw material for medicine and aromatic products	Mass (tonnes or kg)
4. Raw material for colorants and dyes	Mass (tonnes or kg)
5. Raw material for utensils, handicrafts & construction	Mass (tonnes or kg)
6. Ornamental plants	Mass (tonnes or kg)
7. Exudates	Mass (tonnes or kg)
8. Other plant products	Mass (tonnes or kg)
Animal products / raw material	
9. Living animals	Units
10. Hides, skins and trophies	Units
11. Wild honey and bee-wax	Mass (tonnes or kg)
12. Bush meat	Mass (tonnes or kg)
13. Raw material for medicine	Mass (tonnes or kg)
14. Raw material for colorants	Mass (tonnes or kg)
15. Other edible animal products	Mass (tonnes or kg)
16. Other non-edible animal products	Mass (tonnes or kg)

Data for most categories should be reported in units of mass (weight); only for the two categories “living animals” and “hides, skins and trophies” the report should refer to “units”. The country may choose to report mass (weight) in either tonnes or kg, furthermore there is an option in the reporting table to set a scale factor. Setting the scale factor to 1000 and units to tonnes, means that reported figures are in 1000 tonnes.

If existing national data are reported in terms of volume instead of mass, data should be converted to mass and it must be well documented in the report how this conversion has been done and what conversion factors have been used.

To take annual variations into account, the figures reported should be an average of a five year period (for reference year 1990 an average of the period 1988 to 1992 and for reference year 2000 an average of the period 1998 to 2002). The figures for 2005 will be forecasts.

Only removals from Forest and Other wooded land should be reported. If a country only has figures referring to all types of land for a certain product, it is necessary to either estimate and document the share that correspond to Forest / OWL or report the available figures and document clearly that it applies to all types of land.

Finally, countries are requested to report in an Appendix, the most important species used for each product category. This information is very important in order to improve reporting for future assessments.

If a country does not have any documented information on a specific non-wood forest product category, but there is a general agreement among local experts on rough figures of removals, the country may choose to report these, stating clearly that the data source is "subjective assessment of local experts". Otherwise, the country may choose to report Insufficient Data (ID).

4.16 Table T14 – Value of non-wood forest products removal

Table T14 is closely related to T13 and aims at showing the economic value of the removed non-wood forest products.

The values to be reported refer to the market value at the site of collection or forest border. If values are obtained from a point further down the production chain, transport costs and possible handling and/or processing costs should be deducted. In case that the NWFP are removed for subsistence use, the value should be calculated based on the local market value.

The value should be reported in USD using the actual exchange rate for the reporting year. In Appendix 4 there is a list of historical exchange rates for most national currencies related to USD. The value should be reported excluding taxes.

The procedure to calculate the value, is the same as for wood in table T12. First, the per unit value of each category is calculated, taking into account that it might be necessary to estimate a weighted average for the category if the different products that make up the category have considerably different market prices. Then, this average is multiplied with the quantity as reported in table T13.

Alternatively, values are estimated for each individual product and then added together to give consolidated figures for the predefined categories.

4.17 Table T15 – Employment in forestry activities

Reporting on employment in forestry activities is new within the FRA reporting context. It responds to the request by COFO and member countries that FAO should facilitate access to information on a wider range of goods and services provided by forests and woodlands.

In this table, countries are requested to report on employment in forestry activities related to the primary production of goods and services.

Note that employment refers to work performed or services rendered in exchange for wage or salary under some kind of contract or agreement. Voluntary work, as well as unpaid work performed by individuals or communities for subsistence or commercial purposes are not included (see further the definitions in the document Specification of National Reporting Tables).

Data reported should preferably be based on national statistics on labor and employment. If partial statistics exist, these can be calibrated to apply to national level. If no national information is available, countries may report Insufficient Data (ID).

5 Guidelines for preparation of country reports on thematic areas

The reports on thematic areas are voluntary reporting tables on issues considered important by each individual country and where recent information on national level is available. As these tables may vary between countries, there are no predefined formats, but it is recommended that the information be organized in the report according to the common themes of the Criteria & Indicators processes. The thematic reporting should also take into consideration the importance of identifying trends, so when possible the thematic reports should follow the same reporting years as the standard reporting tables. It is also important to describe data sources, methodology, etc. in a similar way as for the standard reporting tables, so that the figures presented in the report are traceable back to original data.

Countries are also reporting to other international processes, conventions and fora on issues related to forestry. Important tables from these reports can also be reproduced in the FRA 2005 country report under Thematic Reporting, making the country report more comprehensive.

The UNFF session for 2005 will make a global evaluation of the progress in implementing sustainable forest management. Countries may wish to take the opportunity of including complementary information that show how the country is proceeding towards sustainable forest management in the FRA 2005 thematic reports.

Thematic reporting may, for example, cover issues such as:

- Ownership and access rights
- Area under management plans
- Area of forest under a forest certification scheme
- Etc.

These are of course only examples and the countries should feel free to include whatever theme they may consider important in the report.

6 How to use the template

A template file has been distributed to the National Correspondents in order to facilitate the compilation of the country report. The Country Report Template contains the basic structure of the country report, following a standardized format for publication as a FRA working paper. This template provides one chapter for each table and, under each table, a number of sub-headings. The sub-headings follow the methodology explained in this document.

It is important that all countries use this template, and provide information under each sub-heading as appropriate. The following may serve as guide as to what should be included under each sub-heading:

FRA 2005 Categories and definitions
The FRA 2005 categories and definitions are included in the beginning of each table to make the Country Report self-explaining without access to other FRA documents.

National Data Sources
Document clearly and concisely all data sources that have been selected and used for the specific FRA 2005 reporting table. Assign a quality rating to the data sources. Comment on any problems encountered in finding relevant data sources. If no data sources have been found that meet the requirements, this should be noted.

National Classification and Definitions
Document clearly and concisely all the classifications and definitions used in the national data sources that have been selected and used for the FRA 2005 reporting process. Comment on any problems or incompatibilities in classification and definitions.

Original National Data
Present in tabular form the data available from the selected data sources. Comment on any inconsistencies or other problems that may affect further analysis.

Calibration
If calibration of area related data has been performed (see chapter 3.3), indicate the calibration factor used. Calibration may also be used if the data presented do not reflect the situation at national level. In such a case, indicate how the calibration has been performed and for what reason.

Estimation and Forecasting
If estimation and/or forecasting has been performed in order to report data for the FRA 2005 reference years (1990, 2000, 2005), indicate how the estimation / forecasting has been performed. Comment on any problems

Reclassification into FRA 2005 Classes
When national data are not directly available for the FRA 2005 categories, a reclassification is necessary. The reclassification matrix should be presented here, and the rationale behind the assignment of reclassification percentages should be indicated.

Data for National reporting table TXX

Insert a table with data according to the template from the document "Specification of National Reporting Tables".

Comments to National reporting table TXX

Use, if necessary, to give any particular comments on the data presented in the national reporting table.

7 Contact information for technical support

The FRA team of professional staff is available to answer questions and give technical support to countries during the reporting process. There is also an electronic discussion forum open for everybody, where questions can be posted, and where the discussions held are visible for everybody. The discussion forum is constantly monitored by the FRA team. The discussion forum can be accessed on the following link:

http://www.fao.org/forestry/site/21330/en

Countries are also welcome to take direct contact with the professional staff at the FRA Secretariat and with the Forestry Officers at the FAO regional and sub-regional offices in matters related to FRA 2005.

General address and contact information for FRA:

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References

FAO, 1948. *Forest resources of the world.* Washington DC.

FAO, 2001. *Global forest resources assessment 2000*. FAO Forestry Paper No. 140. Rome.

FAO, 2003. *FAO Yearbook of Forest Products 2001*. FAO Forestry Series No. 36, FAO Statistics Series No. 171. Rome.

IPCC, 2004. *Good Practice Guidance for Land Use, Land-Use Change and Forestry.* (to be published during 2004).

APPENDICES

Appendix 1 – Complete example of country reporting for table T1

Appendix 2 – List of UN official country areas

Appendix 3 – Roundwood production officially reported to FAO

Appendix 4 – Historical exchange rates

Appendix 5 – Conversion factors for volume, biomass and carbon

Table 5.1	General weight and volume conversion factors
Table 5.2	Basic wood densities – Boreal and temperate species
Table 5.3	Basic wood densities – Tropical species
Table 5.4	Default biomass expansion factors
Table 5.5	Default root-shoot biomass ratios
Table 5.6	Default dead-live biomass ratios
Table 5.7	Default values for carbon in litter
Table 5.8	Default values for soil carbon

Appendix 1 – Example of country reporting for table T1

The following example illustrates country reporting for table T1, following the structure proposed in the Template for Country Reporting. The example shows how the standard methodology can be applied when completing a reporting table. The national data in this example are entirely hypothetical and does not correspond to any specific country.

2. Table T1 - Extent of Forest and Other wooded land

2.1. FRA 2005 Categories and definitions

Category	Definition
Forest	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.
Other wooded Land	Land not classified as "Forest", spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5-10 percent, or trees able to reach these thresholds *in situ*; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use.
Other land	All land that is not classified as "Forest" or "Other Wooded Land".
Other land with tree cover (Subordinated to "Other land")	Land classified as "Other land", spanning more than 0.5 hectares with a canopy cover of more than 10 percent of trees able to reach a height of 5 meters at maturity.
Inland water bodies	Inland water bodies generally include major rivers, lakes and water reservoirs.

2.2. National data

2.2.1. National data sources

References to sources of information	Quality (H/M/L)	Variable	Years	Additional comments
a) Smith, B 1988. *National Pine forest and mangrove inventory.* Hypothetical country	M[1]	Land use, Forest cover, Growing stock	1986	National inventory of pine and mangrove forests covering the whole country, using remote sensing and field sample plots.
b) Grove 2000., N. *Forestry national report on state of the forest to the year 2000 for Hypothetical country.*	M[1]	Forest cover	1992	Analysis of forest cover based on satellite images.
c) Forestry Department 2003. *State of the forest.* Hypothetical country	L[2]	Forest cover change	2000	Provides secondary information on trends of forest cover in the country according to expert knowledge.

[1] Assessed as Medium quality "M". The source document only provides information for two of the three main forest classes.
[2] Assessed as Low quality "L". Reference is based on expert knowledge not supported by field information.

2.2.2. National classifications and definitions

National class	Definition
Coppice forest	The coppice hardwood forests are native forests of various hardwood species such as buttonwood, mahogany, gum elemi, rat wood, black ebony, braziletto, horseflesh and red cedar.
Pine forest	Pine forests of *Pinus caribaea.*
Wetlands	Land that includes the mangrove forest ecosystems which occurs predominantly on the shores of the country covering the 80 percent of the total wetland. It also includes swamps, and low lands.
Forest land	Includes all land classified as Coppice forest, Pine forest and Wetlands.
Non-forest land	Includes all land not classified as forest land.

Information on threshold values (canopy cover, tree height, etc.) used for defining Forest and Other wooded land in FRA 2005 is not defined in national definitions. For that reason, based on local expert advice, it is assumed that national definitions of "pine forests", "coppice forest" and "mangrove forest" correspond with the FRA 2005 thresholds for classifying them as "Forest".

2.2.3. Original national data

National class	1986 1000 ha	1992 1000 ha
Pine forest	200,000	185,000
Coppice forest[1]	600,000	600,000
Wetland	100,000	100,000
Total forest land	**900,000**	**885,000**
Non-forest land [2]	100,000	115,000
Total land area	**1,000,000**	**1,000,000**

[1)] Estimated from original data as: Total forest land area - area of pine forest – area of wetland
[2)] Estimated from original data as: Total land area – Total forest land area

Note that national data does not provide any assessment of the area of Coppice forest. Additionally, the inventory of the mangrove forests (Smith, 1988) showed that of the wetlands, 80% of the area was covered by mangrove forests and the remaining 20% were swamps.

2.3. Analysis and processing of national data

2.3.1. Calibration

Source	Total land area (1000 hectares)
National data	1,000,000
FAOSTAT	1,000,000

There is no need to perform calibration since the national land area data matches the FAOSTAT land area.

2.3.2. Estimation and forecasting

National classes	1986 1000 ha	1992 1000 ha	1990 [2] 1000 ha	2000 [2] 1000 ha	2005 [2] 1000 ha
Pine forest	200 000	185 000	190 000	165 000	152 500
Coppice forest [1]	600 000	600 000	600 000	600 000	600 000
Wetlands [1]	100 000	100 000	100 000	100 000	100 000
Total forest land area	**900 000**	**885 000**	**890 000**	**865 000**	**852 500**
Non-forest land	100 000	115 000	110 000	135 000	147 500
Total land area	**1 000 000**	**1 000 000**	**1 000 000**	**1 000 000**	**1 000 000**

[1] There has been no change in the categories of coppice forest and wetland forest as these are under protection since the year 1977. (Forestry Department, 2003)

[2] Data for the year 1990 was estimated using linear interpolation of the data from 1986 and 1992. Similarly, data for years 2000 and 2005 were forecasted using the same linear trend.

The estimated and forecasted figures are considered by local expertise to well describe the current state and trends.

2.4. Reclassification into FRA 2005 classes

	FRA 2005 Categories				
National classes	Forest	OWL	Other Land	Total	OLWTC
Pine forest [1]	100%			100%	NDA [2]
Coppice forest [1]	100%			100%	NDA [2]
Wetlands [3]	80%		20%	100%	NDA [2]
Non-forest land [1]		20%	80%	100%	NDA [2]

[1] Assessment based on expert knowledge

[2] No data or knowlegde available for making assessment of area under "Other land with tree cover"

[3] Inventory of mangrove forest (Smith, 1988)

2.5. Data for national reporting table

FRA 2005 categories	Area 1000 hectares		
	1990	2000	2005
Forest	870 000	845 000	832 500
Other wooded land	22 000	27 000	29 500
Other land	108 000	128 000	138 000
.... of which with tree cover	NDA [1]	NDA [1]	NDA [1]
Total land area	1 000 000	1 000 000	1 000 000
Inland water bodies [2]	5 000	5 000	5 000
Total area for country	**1 005 000**	**1 005 000**	**1 005 000**

[1] No data available
[2] Data on area of inland water bodies from FAOSTAT

2.6. Comments to National reporting table T1

The main weakness in the existing national data is the lack of information on the Coppice forest. Another weakness is that there is no national information available on Other land, and particularly the part of Other land that has a tree cover.

Appendix 2 - Country areas (Source: FAOSTAT)

COUNTRY	Land Area (1000 ha)	Inland water (1000 ha)	Total Area (1000 ha)
Afghanistan	65 209	0	65 209
Albania	2 740	135	2 875
Algeria	238 174	0	238 174
American Samoa	20	0	20
Andorra	45	0	45
Angola	124 670	0	124 670
Antigua and Barbuda	44	0	44
Argentina	273 669	4 371	278 040
Armenia	2 820	160	2 980
Aruba	19	0	19
Australia	768 230	5 892	774 122
Austria	8 273	113	8 386
Azerbaijan, Republic of	8 660	0	8 660
Bahamas	1 001	387	1 388
Bahrain	71	0	71
Bangladesh	13 017	1 383	14 400
Barbados	43	0	43
Belarus	20 748	12	20 760
Belgium-Luxembourg	3 282	30	3 312
Belize	2 280	16	2 296
Benin	11 062	200	11 262
Bermuda	5	0	5
Bhutan	4 700	0	4 700
Bolivia	108 438	1 420	109 858
Bosnia and Herzegovina	5 073	47	5 120
Botswana	56 673	1 500	58 173
Brazil	845 651	9 089	854 740
British Indian Ocean Ter	8	0	8
British Virgin Islands	15	0	15
Brunei Darussalam	527	50	577
Bulgaria	11 055	36	11 091
Burkina Faso	27 360	40	27 400
Burundi	2 568	215	2 783
Cambodia	17 652	452	18 104
Cameroon	46 540	1 004	47 544
Canada	922 097	74 964	997 061
Canton and Enderbury Is	7	0	7
Cape Verde	403	0	403
Cayman Islands	26	0	26
Central African Republic	62 298	0	62 298
Chad	125 920	2 480	128 400
Chile	74 880	783	75 663
China, Hong Kong SAR	99	8	107
China, Macao SAR	2	0	2
China, Mainland	929 100	27 000	956 100
China, Taiwan Prov of	3 541	55	3 596
Christmas Island	13	0	13
Cocos (Keeling) Islands	1	0	1
Colombia	103 870	10 021	113 891
Comoros	223	0	223
Congo, Dem Republic of	226 705	7 781	234 486
Congo, Republic of	34 150	50	34 200
Cook Islands	23	0	23

Appendix 2 - Country areas (Source: FAOSTAT)

COUNTRY	Land Area (1000 ha)	Inland water (1000 ha)	Total Area (1000 ha)
Costa Rica	5 106	4	5 110
Croatia	5 592	62	5 654
Cuba	10 982	104	11 086
Cyprus	924	1	925
Czech Republic	7 728	159	7 887
Côte d'Ivoire	31 800	446	32 246
Denmark	4 243	66	4 309
Djibouti	2 318	2	2 320
Dominica	75	0	75
Dominican Republic	4 838	35	4 873
Ecuador	27 684	672	28 356
Egypt	99 545	600	100 145
El Salvador	2 072	32	2 104
Equatorial Guinea	2 805	0	2 805
Eritrea	10 100	1 660	11 760
Estonia	4 227	283	4 510
Ethiopia	100 000	10 430	110 430
Faeroe Islands	140	0	140
Falkland Is (Malvinas)	1 217	0	1 217
Fiji Islands	1 827	0	1 827
Finland	30 459	3 356	33 815
France	55 010	140	55 150
French Guiana	8 815	185	9 000
French Polynesia	366	34	400
Gabon	25 767	1 000	26 767
Gambia	1 000	130	1 130
Gaza Strip (Palestine)	38	0	38
Georgia	6 949	21	6 970
Germany	34 895	808	35 703
Ghana	22 754	1 100	23 854
Gibraltar	1	0	1
Greece	12 890	306	13 196
Greenland	41 045	0	41 045
Grenada	34	0	34
Guadeloupe	169	2	171
Guam	55	0	55
Guatemala	10 843	46	10 889
Guinea	24 572	14	24 586
Guinea-Bissau	2 812	800	3 612
Guyana	19 685	1 812	21 497
Haiti	2 756	19	2 775
Honduras	11 189	20	11 209
Hungary	9 211	92	9 303
Iceland	10 025	275	10 300
India	297 319	31 407	328 726
Indonesia	181 157	9 300	190 457
Iran, Islamic Rep of	163 620	1 200	164 820
Iraq	43 737	95	43 832
Ireland	6 889	138	7 027
Israel	2 062	44	2 106
Italy	29 411	723	30 134
Jamaica	1 083	16	1 099
Japan	36 450	1 330	37 780

Appendix 2 - Country areas (Source: FAOSTAT)

COUNTRY	Land Area (1000 ha)	Inland water (1000 ha)	Total Area (1000 ha)
Jordan	8 893	28	8 921
Kazakhstan	269 970	2 520	272 490
Kenya	56 914	1 123	58 037
Kiribati	73	0	73
Korea, Dem People's Rep	12 041	13	12 054
Korea, Republic of	9 873	53	9 926
Kuwait	1 782	0	1 782
Kyrgyzstan	19 180	810	19 990
Laos	23 080	600	23 680
Latvia	6 205	255	6 460
Lebanon	1 023	17	1 040
Lesotho	3 035	0	3 035
Liberia	9 632	1 505	11 137
Libyan Arab Jamahiriya	175 954	0	175 954
Liechtenstein	16	0	16
Lithuania	6 480	40	6 520
Macedonia, The Fmr Yug Rp	2 543	28	2 571
Madagascar	58 154	550	58 704
Malawi	9 408	2 440	11 848
Malaysia	32 855	120	32 975
Maldives	30	0	30
Mali	122 019	2 000	124 019
Malta	32	0	32
Marshall Islands	18	0	18
Martinique	106	4	110
Mauritania	102 522	30	102 552
Mauritius	203	1	204
Mexico	190 869	4 951	195 820
Micronesia, Fed States of	70	0	70
Moldova, Republic of	3 291	94	3 385
Mongolia	156 650	0	156 650
Montserrat	10	0	10
Morocco	44 630	25	44 655
Mozambique	78 409	1 750	80 159
Myanmar	65 755	1 903	67 658
Namibia	82 329	100	82 429
Nauru	2	0	2
Nepal	14 300	418	14 718
Netherlands	3 388	765	4 153
Netherlands Antilles	80	0	80
New Caledonia	1 828	30	1 858
New Zealand	26 799	254	27 053
Nicaragua	12 140	860	13 000
Niger	126 670	30	126 700
Nigeria	91 077	1 300	92 377
Niue	26	0	26
Norfolk Island	4	0	4
Northern Mariana Is	46	0	46
Norway	30 683	1 705	32 388
Oman	30 950	0	30 950
Pacific Islands Trust Tr	0	0	0
Pakistan	77 088	2 522	79 610
Palau	46	0	46

Appendix 2 - Country areas (Source: FAOSTAT)

COUNTRY	Land Area (1000 ha)	Inland water (1000 ha)	Total Area (1000 ha)
Panama	7 443	109	7 552
Papua New Guinea	45 286	998	46 284
Paraguay	39 730	945	40 675
Peru	128 000	522	128 522
Philippines	29 817	183	30 000
Poland	30 435	834	31 269
Portugal	9 150	48	9 198
Puerto Rico	887	8	895
Qatar	1 100	0	1 100
Romania	23 034	805	23 839
Russian Federation	1 688 850	18 690	1 707 540
Rwanda	2 467	167	2 634
Réunion	250	1	251
Saint Helena	31	0	31
Saint Kitts and Nevis	36	0	36
Saint Lucia	61	1	62
Saint Pierre & Miquelon	23	1	24
Saint Vincent/Grenadines	39	0	39
Samoa	283	1	284
San Marino	6	0	6
Sao Tome and Principe	96	0	96
Saudi Arabia	214 969	0	214 969
Senegal	19 253	419	19 672
Serbia and Montenegro	10 200	17	10 217
Seychelles	45	0	45
Sierra Leone	7 162	12	7 174
Singapore	61	1	62
Slovakia	4 808	93	4 901
Slovenia	2 012	13	2 025
Solomon Islands	2 799	91	2 890
Somalia	62 734	1 032	63 766
South Africa	122 104	0	122 104
Spain	49 944	655	50 599
Sri Lanka	6 463	98	6 561
Sudan	237 600	12 981	250 581
Suriname	15 600	727	16 327
Swaziland	1 720	16	1 736
Sweden	41 162	3 834	44 996
Switzerland	3 955	174	4 129
Syrian Arab Republic	18 378	140	18 518
Tajikistan	14 060	250	14 310
Tanzania, United Rep of	88 359	6 150	94 509
Thailand	51 089	223	51 312
Timor-Leste	1 487	0	1 487
Togo	5 439	240	5 679
Tokelau	1	0	1
Tonga	72	3	75
Trinidad and Tobago	513	0	513
Tunisia	15 536	825	16 361
Turkey	76 963	519	77 482
Turkmenistan	46 993	1 817	48 810
Turks and Caicos Is	43	0	43
Tuvalu	3	0	3

Appendix 2 - Country areas (Source: FAOSTAT)

COUNTRY	Land Area (1000 ha)	Inland water (1000 ha)	Total Area (1000 ha)
US Virgin Islands	34	0	34
Uganda	19 710	4 394	24 104
Ukraine	57 935	2 435	60 370
United Arab Emirates	8 360	0	8 360
United Kingdom	24 088	203	24 291
United States of America	915 896	47 013	962 909
Uruguay	17 502	120	17 622
Uzbekistan	41 424	3 316	44 740
Vanuatu	1 219	0	1 219
Venezuela, Boliv Rep of	88 205	3 000	91 205
Viet Nam	32 549	620	33 169
Wallis and Futuna Is	20	0	20
West Bank	580	28	608
Western Sahara	26 600	0	26 600
Yemen	52 797	0	52 797
Zambia	74 339	922	75 261
Zimbabwe	38 685	391	39 076

Source:http://faostat.fao.org/faostat/default.jsp?version=int&hasbulk=1

Appendix 3 - Table 3-1

Production of industrial roundwood - m^3 under bark

Country	Year														
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
USSR	305,350,000	305,350,000	305,300,000	275,300,000											
Afghanistan	1,440,000	1,447,000	1,464,000	1,495,000	1,536,000	1,583,000	1,628,000	1,667,000	1,697,000	1,718,000	1,737,000	1,760,000	1,760,000	1,760,000	1,760,000
Albania	650,000	680,000	520,000	1,000,000	1,000,000	57,000	63,500	63,500	63,500	63,500	15,080	56,000	123,000	78,000	82,600
Algeria	249,000	255,000	261,000	333,000	351,000	446,000	391,000	390,000	428,000	438,000	444,000	451,000	162,000	208,000	208,000
Angola	802,000	824,000	843,000	869,000	897,000	927,000	958,000	989,000	1,020,000	1,052,000	1,084,000	1,116,000	1,116,000	1,116,000	1,116,000
Argentina	6,624,000	6,724,000	6,824,000	6,924,000	7,577,000	5,861,000	6,428,000	6,916,000	7,687,000	5,732,000	4,638,000	6,652,000	6,005,000	5,335,000	5,335,000
Armenia					0	0	0	0	0	0	0	0	0	7,000	8,000
Australia	16,902,000	16,584,000	17,213,000	16,604,000	16,654,000	17,659,000	18,762,000	19,560,000	19,340,000	19,908,000	21,184,000	20,587,000	24,042,000	24,353,000	24,322,000
Austria	12,238,000	13,575,000	14,160,000	13,135,000	9,855,000	9,708,000	11,701,000	11,346,000	11,812,000	11,902,000	10,858,000	10,988,000	10,416,000	10,562,000	11,809,000
Azerbaijan, Republic of					0	0	0	0	0	0	6,400	6,400	7,100	7,100	7,100
Bahamas	115,000	115,000	115,000	115,000	115,000	117,000	117,000	117,000	117,000	117,000	17,000	17,000	17,000	17,000	17,000
Bangladesh	893,000	837,000	641,000	706,000	646,000	706,000	663,000	579,000	604,000	610,000	617,000	623,000	623,000	588,000	575,000
Barbados	0	0	0	0	1,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Belarus					10,583,000	9,206,000	9,206,000	9,206,000	14,898,000	16,776,000	5,034,000	5,417,600	5,207,600	5,538,000	5,969,000
Belgium	0	0	0	0	0	0	0	0	0	0	0	4,250,000	3,960,000	3,665,000	3,950,000
Belgium-Luxembourg	3,408,000	4,260,000	5,060,000	4,205,000	3,690,000	3,690,000	3,790,000	3,610,000	3,485,000	3,455,000	4,287,400	0	0	0	0
Belize	61,600	61,600	61,600	61,600	61,600	61,600	61,600	61,600	61,600	61,600	61,600	61,600	61,600	61,600	61,600
Benin	250,000	259,000	274,000	300,000	296,000	303,000	310,000	300,000	304,000	315,000	326,000	332,000	332,000	332,000	332,000
Bhutan	122,000	68,000	48,700	60,800	78,600	63,500	63,500	45,000	45,000	45,000	45,000	139,000	134,000	134,000	134,000
Bolivia	273,500	255,500	371,500	461,500	598,000	750,900	879,400	850,400	892,400	890,400	815,400	502,000	468,000	8,886,000	8,054,000
Bosnia and Herzegovina					40,000	40,000	40,000	40,000	40,000	3,090,000	3,220,000	3,220,000	3,332,000	2,958,000	3,076,000
Botswana	79,000	81,000	84,000	87,000	89,000	92,000	95,000	97,000	99,000	102,000	103,000	105,000	105,000	105,000	105,000
Brazil	72,473,008	78,973,016	74,277,024	76,676,016	79,264,016	81,350,000	83,435,000	84,518,000	84,601,000	84,684,000	83,764,000	100,395,000	102,994,000	102,994,000	102,994,000
Brunei Darussalam	215,000	215,000	215,000	215,000	216,000	216,000	216,000	216,000	217,000	217,000	217,000	217,000	217,000	217,000	217,000
Bulgaria	2,643,000	2,676,000	2,586,000	2,200,000	1,675,000	1,837,000	1,798,000	1,970,000	2,020,000	1,862,000	1,842,667	3,250,667	2,676,890	2,356,890	2,645,890
Burkina Faso	377,400	388,400	399,400	410,400	421,400	433,400	449,400	462,500	475,000	490,000	500,600	592,000	594,000	594,000	594,000
Burundi	48,000	49,000	48,700	52,200	53,200	96,750	106,900	114,500	111,500	145,000	291,000	326,000	333,000	333,000	333,000
Cambodia	567,000	567,000	567,000	740,000	735,000	695,000	959,000	1,040,000	1,040,000	1,040,000	1,040,000	921,000	179,000	123,000	125,000
Cameroon	2,708,000	2,872,000	3,136,000	3,085,000	2,928,000	2,936,000	3,311,000	3,588,000	3,733,000	3,255,000	2,107,000	1,832,000	1,894,000	1,270,000	1,270,000
Canada	184,327,000	182,104,000	155,958,000	153,487,000	163,507,000	169,770,000	177,346,000	183,113,000	184,459,000	185,859,000	173,901,000	190,846,008	197,373,008	197,373,008	197,373,008
Central African Republic	394,000	475,000	425,000	379,000	484,000	441,000	578,000	611,000	596,000	758,000	831,000	861,000	1,011,000	1,058,000	1,058,000
Chad	535,000	546,000	559,000	597,000	619,400	645,000	666,000	686,000	705,000	724,000	742,000	761,000	761,000	761,000	761,000
Chile	11,727,000	11,834,000	14,386,000	16,314,000	19,357,000	20,534,000	21,387,000	24,880,000	19,382,000	19,570,000	21,314,000	23,179,000	24,437,000	25,682,000	25,491,000
China, Mainland	96,590,016	95,119,008	89,677,008	88,238,000	90,931,008	96,867,016	97,521,000	99,769,000	106,857,000	105,185,000	105,576,000	98,500,000	94,560,000	92,000,000	91,260,000
China, Taiwan Prov of	1,861,000	1,861,000	1,861,000	1,861,000	1,861,000	1,861,000	1,861,000	1,861,000	1,861,000	1,861,000	1,861,000	1,861,000	1,861,000	1,861,000	1,861,000
Colombia	3,683,000	3,683,000	3,683,000	3,625,000	2,810,000	2,645,000	2,495,000	2,445,000	2,395,000	2,361,000	2,733,000	2,396,000	2,164,000	1,741,000	2,011,500
Comoros	0	0	0	0	0	0	0	7,900	8,100	8,300	8,500	8,650	8,650	8,650	8,650
Congo, Dem Republic of	2,909,000	2,914,000	3,053,000	3,081,000	3,134,000	3,211,000	3,309,000	3,369,000	3,545,000	3,578,000	3,644,000	3,653,000	3,653,000	3,653,000	3,653,000
Congo, Republic of	1,516,000	1,553,000	1,598,000	1,176,000	1,329,000	1,338,000	1,319,000	1,471,000	1,164,000	1,634,000	1,543,000	1,251,000	1,251,000	1,251,000	1,251,000
Cook Islands	0	0	0	0	0	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Costa Rica	1,146,000	1,029,000	987,000	930,000	1,073,000	1,110,000	1,597,000	1,655,000	1,661,000	1,668,000	1,666,000	1,673,000	1,687,000	1,687,000	1,687,000
Croatia					1,421,000	1,741,000	1,804,000	1,744,000	1,710,000	2,044,000	2,291,000	2,392,000	2,693,000	2,721,000	2,886,000
Cuba	576,000	611,000	611,000	611,000	611,000	611,000	611,000	611,000	611,000	611,000	611,000	406,000	856,000	808,000	808,000
Cyprus	47,000	49,000	48,000	41,700	33,900	39,200	35,400	37,100	35,200	31,300	27,027	28,412	15,153	11,756	10,211
Czech Republic						9,706,000	11,172,000	11,716,000	11,882,000	12,881,000	13,171,000	13,363,000	13,501,000	13,364,000	13,534,000
Czechoslovakia	16,564,000	16,856,000	16,398,000	13,770,000	0										
Côte d'Ivoire	2,736,000	2,787,000	3,548,000	2,977,000	2,777,000	2,770,000	3,248,000	3,150,000	2,952,000	2,941,000	3,146,000	3,138,000	3,416,000	3,531,000	3,000,000
Denmark	1,690,000	1,680,000	1,806,000	1,859,000	1,743,000	1,818,000	1,797,000	1,797,000	1,797,000	1,644,000	1,066,000	1,236,000	2,492,000	996,000	789,000
Djibouti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dominican Republic	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300	6,300

Appendix 3 - Table 3-1

Production of industrial roundwood - m^3 under bark

Country	Year														
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Ecuador	2,968,900	3,085,900	3,530,900	3,117,000	3,268,000	1,204,000	4,837,000	5,823,000	6,244,000	6,683,000	6,704,000	546,000	546,000	858,000	913,000
Egypt	107,000	110,000	112,000	115,000	117,000	119,000	122,000	124,000	255,000	258,000	262,000	268,000	268,000	268,000	268,000
El Salvador	120,000	146,000	146,000	146,000	146,000	146,000	146,000	206,000	211,000	666,000	610,000	650,000	682,000	682,000	682,000
Equatorial Guinea	180,000	193,000	187,000	142,000	166,000	191,000	267,000	364,000	364,000	364,000	364,000	364,000	364,000	364,000	364,000
Eritrea						0	0	1,631	1,783	1,370	1,846	1,924	1,924	1,924	1,924
Estonia					1,339,000	1,391,000	3,006,000	3,137,000	3,297,000	4,023,000	5,368,000	5,900,000	7,270,000	8,320,000	8,570,000
Ethiopia						2,145,000	2,219,000	2,295,800	2,430,000	2,397,800	2,397,300	2,454,300	2,459,000	2,457,600	2,458,400
Ethiopia PDR	1,756,000	1,749,000	1,725,000	1,713,000	1,708,000										
Fiji Islands	295,500	269,800	269,800	269,800	269,800	491,600	522,200	561,200	561,200	459,200	479,000	428,000	449,000	479,000	346,000
Finland	41,953,000	43,331,000	40,246,000	31,941,000	35,604,000	38,083,000	44,644,000	46,124,000	42,503,000	47,288,000	49,540,862	49,593,000	50,147,073	47,727,000	48,529,000
France	32,612,000	34,276,000	34,913,000	33,754,000	32,584,000	29,566,000	32,440,000	33,572,000	30,643,000	31,316,000	32,717,684	33,236,820	43,440,000	37,471,000	33,500,000
French Guiana	188,000	188,000	188,000	188,000	188,000	59,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Gabon	1,381,000	1,422,000	1,633,000	1,326,000	1,529,000	1,859,000	2,127,000	2,298,000	2,409,000	2,775,000	2,775,000	2,338,000	2,584,000	2,584,000	2,584,000
Gambia	46,600	56,600	66,600	81,600	96,600	109,700	112,700	112,700	112,700	112,700	112,700	112,700	112,700	112,700	112,700
Georgia					0	0	0	0	0	0	0	0	0	0	0
Germany	39,188,000	43,760,000	80,341,000	29,823,000	29,159,000	29,357,000	36,018,000	36,914,000	34,538,000	35,488,000	36,441,000	35,063,000	51,088,000	36,502,000	37,755,000
Ghana	970,000	920,000	1,440,000	1,379,000	1,300,000	1,832,000	1,864,000	1,283,000	1,255,000	1,278,000	1,227,000	1,102,000	998,000	1,212,000	1,104,000
Greece	944,000	1,109,000	1,146,000	1,196,000	684,000	699,000	737,000	631,000	674,000	508,000	495,000	811,000	643,528	514,932	498,297
Guadeloupe	2,000	2,000	2,000	5,800	4,900	300	300	300	300	300	300	300	300	300	300
Guatemala	169,000	183,000	198,000	213,000	227,000	706,100	737,400	795,400	293,400	201,400	201,400	506,000	467,000	444,000	518,000
Guinea	513,000	525,000	541,000	560,000	582,000	604,000	624,000	669,000	677,000	671,000	650,000	651,000	651,000	651,000	651,000
Guinea-Bissau	141,000	143,000	145,000	149,000	151,000	153,000	156,000	159,000	161,000	164,000	167,000	170,000	170,000	170,000	170,000
Guyana	209,000	209,000	150,000	150,000	166,000	268,000	413,200	476,100	467,500	573,200	406,000	454,000	289,000	312,000	269,000
Haiti	239,000	239,000	239,000	239,000	239,000	239,000	239,000	239,000	239,000	239,000	239,000	239,000	239,000	239,000	239,000
Honduras	968,000	871,000	751,000	709,000	558,000	609,600	715,800	486,800	646,000	719,000	795,000	856,000	756,000	832,000	971,000
Hungary	3,650,000	3,660,000	3,518,000	3,199,000	2,831,000	2,266,000	2,461,000	2,383,000	1,800,000	2,332,000	2,296,000	3,300,000	3,305,100	3,492,000	3,438,200
Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
India	24,219,000	24,314,000	24,407,000	24,501,000	24,597,000	24,691,000	24,785,000	24,879,000	19,395,000	19,089,000	18,918,000	19,208,000	18,761,000	19,299,000	19,308,000
Indonesia	38,545,500	41,777,500	38,365,500	41,990,500	43,107,500	44,082,500	42,616,500	43,202,500	47,241,500	45,537,500	43,715,500	39,796,500	33,496,500	26,496,600	32,996,500
Iran, Islamic Rep of	806,000	897,000	891,000	1,132,000	1,062,000	1,195,000	1,228,000	1,150,000	1,140,000	1,213,000	1,059,000	960,000	1,060,000	1,060,000	1,060,000
Iraq	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	59,000	59,000	59,000	59,000	59,000
Ireland	1,327,000	1,450,000	1,575,000	1,620,000	1,910,000	1,764,000	1,958,000	2,140,000	2,225,000	2,117,000	2,193,000	2,511,000	2,600,100	2,423,000	2,454,800
Israel	105,000	90,000	100,000	100,000	100,000	100,000	100,000	100,000	95,000	110,000	100,000	100,000	72,988	24,957	24,957
Italy	4,680,000	4,669,000	4,335,000	4,088,000	3,525,000	4,120,000	3,984,000	4,473,000	4,163,000	3,924,000	4,367,000	4,213,000	3,649,000	2,949,000	3,222,000
Jamaica	207,000	205,000	202,000	167,000	195,500	180,400	275,000	277,100	278,200	279,300	282,400	282,400	282,400	282,400	282,400
Japan	30,511,000	30,515,000	29,300,000	27,938,000	27,114,000	25,570,000	24,456,000	22,897,000	22,469,000	21,545,000	19,316,000	18,737,000	17,987,000	15,774,000	15,092,000
Jordan	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Kazakhstan					0	0	0	0	0	0	0	0	0	0	0
Kenya	1,672,000	1,714,000	1,743,000	1,775,000	1,804,000	1,833,000	1,861,000	1,887,000	1,912,000	1,935,000	1,956,000	1,977,000	1,977,000	1,977,000	1,977,000
Korea, Dem People's Rep	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	1,000,000	1,200,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000
Korea, Republic of	1,246,000	1,227,000	1,139,000	1,286,000	1,123,000	1,184,000	1,173,000	1,366,000	1,195,000	1,062,000	1,428,000	1,694,000	1,592,000	1,533,000	1,605,000
Kyrgyzstan					0	0	0	0	0	7,600	0	0	9,000	10,000	10,000
Laos	311,000	314,000	455,000	637,000	355,000	629,000	666,000	994,000	782,000	685,000	571,000	866,000	567,000	570,000	392,000
Latvia					1,771,000	3,831,000	4,590,000	5,690,000	5,550,000	5,833,000	7,185,000	11,518,000	12,624,000	11,261,000	12,268,840
Lebanon	13,000	14,000	7,000	8,580	7,150	7,150	7,150	7,150	7,150	7,150	7,150	7,150	7,150	7,150	7,150
Liberia	1,162,000	1,166,000	1,128,000	747,000	1,035,000	935,000	629,000	228,000	164,000	223,000	321,000	337,000	337,000	337,000	337,000
Libyan Arab Jamahiriya	104,000	105,000	107,000	107,000	108,000	109,000	110,000	111,000	112,000	114,000	115,000	116,000	116,000	116,000	116,000
Liechtenstein	0	0	0	0	12,000	11,000	21,000	14,000	9,000	9,000	9,000	3,333	20,000	18,000	18,000
Lithuania					1,784,000	2,728,000	2,256,000	4,870,000	4,310,000	4,000,000	3,709,000	3,800,000	4,050,000	4,220,000	4,860,000
Luxembourg	0	0	0	0	0	0	0	0	0	0	0	241,000	241,700	135,430	135,460

Appendix 3 - Table 3-1

Production of industrial roundwood - m^3 under bark

Country	Year														
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Macedonia,The Fmr Yug Rp					0	163,000	166,000	151,000	158,000	158,000	156,500	123,000	177,000	135,000	112,000
Madagascar	807,000	807,000	807,000	807,000	807,000	617,000	466,000	433,500	381,000	373,000	115,000	115,000	93,000	93,000	97,000
Malawi	363,000	378,000	422,000	429,000	476,000	481,000	481,000	484,000	490,000	499,000	509,000	520,000	520,000	520,000	520,000
Malaysia	40,389,008	42,487,000	41,260,008	41,381,000	45,038,000	38,004,000	36,433,000	35,753,000	31,544,000	32,538,000	23,012,000	23,237,000	15,095,000	16,161,000	17,913,000
Mali	335,800	345,800	356,800	350,800	358,800	366,800	375,800	374,900	383,900	393,900	402,900	412,900	412,900	412,900	412,900
Malta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Martinique	3,200	1,900	1,900	1,900	2,800	1,800	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Mauritania	5,000	5,000	5,000	5,000	5,000	5,000	5,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Mauritius	13,340	14,500	11,100	14,100	12,450	12,750	10,800	6,190	8,260	8,260	12,000	13,000	8,000	8,000	8,000
Mexico	7,261,000	8,311,000	7,580,000	7,199,000	7,045,000	5,949,000	6,049,000	6,060,000	6,544,000	7,313,000	7,931,000	8,105,000	8,105,000	7,420,000	7,420,000
Moldova, Republic of					0	0	0	0	53,000	50,000	17,000	12,700	28,800	27,300	27,300
Mongolia	1,028,000	1,019,000	806,000	631,000	603,000	604,000	542,000	445,000	445,000	445,000	445,000	445,000	445,000	445,000	445,000
Morocco	514,000	765,000	583,000	1,104,000	915,000	545,300	1,044,600	889,600	935,000	445,000	976,000	570,000	569,000	575,000	526,000
Mozambique	905,000	904,000	923,000	952,000	967,000	1,020,000	1,069,000	1,151,000	1,186,000	1,268,000	1,294,000	1,319,000	1,319,000	1,319,000	1,319,000
Myanmar	2,957,000	3,077,000	3,653,000	4,013,000	4,035,000	3,261,000	2,659,000	2,809,000	2,987,000	3,307,000	2,110,000	3,348,000	3,612,000	3,962,000	5,539,000
Nepal	560,000	560,000	570,000	620,000	620,000	620,000	620,000	620,000	620,000	620,000	1,260,000	1,260,000	1,260,000	1,260,000	1,260,000
Netherlands	1,200,000	1,215,000	1,275,000	996,000	1,092,000	900,000	863,000	941,000	829,000	986,000	873,000	882,000	879,000	729,000	703,000
New Caledonia	12,100	12,100	12,100	6,000	6,400	4,000	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800
New Zealand	9,764,000	10,695,000	11,947,000	14,268,000	15,015,000	15,978,000	16,212,000	16,861,000	16,343,000	17,109,000	15,302,000	17,686,000	19,279,000	20,673,000	22,613,000
Nicaragua	300,000	300,000	300,000	300,000	139,000	128,000	121,000	148,000	267,000	228,000	228,000	228,000	228,000	93,000	124,000
Niger	287,000	296,000	306,000	316,000	327,000	338,000	350,000	362,000	374,000	386,000	399,000	411,000	411,000	411,000	411,000
Nigeria	7,868,000	7,868,000	8,263,000	8,263,000	8,263,000	8,263,000	8,263,000	8,263,000	8,479,000	9,079,000	9,418,000	9,418,000	9,418,000	9,418,000	9,418,000
Norway	10,099,000	10,590,000	10,900,000	10,345,000	9,200,000	9,253,000	8,274,000	8,575,000	7,956,000	8,047,000	7,670,100	7,707,000	7,477,790	7,884,540	7,460,170
Pakistan	1,145,000	1,588,000	2,618,000	2,421,000	2,640,000	2,202,000	1,924,000	1,535,000	2,062,000	2,270,000	2,329,000	2,385,000	2,680,000	2,679,000	2,679,000
Panama	108,299	108,299	108,299	91,999	119,799	119,799	119,799	119,799	92,299	97,300	5,000	48,000	47,000	73,000	153,000
Papua New Guinea	2,698,000	2,698,000	2,655,000	2,655,000	2,464,000	3,289,000	3,739,000	3,239,000	3,239,000	3,239,000	3,064,000	3,064,000	2,184,000	1,708,000	1,708,000
Paraguay	3,106,000	3,323,000	3,500,000	3,637,000	3,657,000	3,774,000	3,877,000	3,988,000	3,927,000	4,017,000	3,989,000	4,044,000	4,044,000	4,044,000	4,044,000
Peru	1,029,900	777,600	1,073,300	922,000	954,200	1,380,200	1,518,800	1,397,000	1,402,000	1,119,000	1,829,000	1,528,000	1,511,000	1,090,000	1,084,000
Philippines	6,137,000	5,533,000	4,928,000	3,796,000	3,215,000	2,895,000	2,965,000	2,814,000	2,863,000	2,699,000	2,822,000	2,970,000	3,079,000	2,685,000	2,689,000
Poland	19,725,000	18,980,000	15,549,000	14,334,000	15,720,000	15,940,000	16,711,000	18,939,000	18,823,000	20,193,000	21,793,000	22,842,000	24,489,000	23,375,000	25,040,000
Portugal	8,839,000	9,705,000	10,705,000	10,309,000	9,778,000	9,707,000	9,319,000	8,850,000	8,428,000	8,428,000	7,948,000	8,378,000	10,231,000	8,346,000	8,142,000
Romania	14,372,000	13,475,000	10,725,000	10,961,000	10,440,000	7,740,000	9,640,000	10,015,000	9,441,000	9,837,000	8,629,000	9,483,500	10,116,000	9,806,000	12,092,000
Russian Federation					164,000,000	136,030,000	79,780,000	82,750,000	73,005,000	88,374,000	77,400,000	94,600,000	105,800,000	117,800,000	125,400,000
Rwanda	240,000	240,000	20,000	20,000	60,000	60,000	111,000	229,000	248,000	315,000	326,000	336,000	336,000	336,000	336,000
Réunion	4,950	4,800	5,900	5,100	5,100	5,100	5,100	5,100	5,100	5,100	5,100	5,100	5,100	5,100	5,100
Samoa	61,000	61,000	61,000	61,000	61,000	61,000	61,000	61,000	61,000	61,000	61,000	61,000	61,000	61,000	61,000
Sao Tome and Principe	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000
Senegal	606,000	622,000	638,000	654,000	670,000	686,000	703,000	720,000	738,000	756,000	775,000	794,000	794,000	794,000	794,000
Serbia and Montenegro					1,236,000	949,000	1,294,000	1,422,000	1,403,000	1,238,000	1,306,000	1,251,000	1,581,500	1,207,400	1,286,000
Sierra Leone	140,000	140,000	138,000	121,600	120,000	123,600	123,600	123,600	123,600	123,600	123,600	123,600	123,600	123,600	123,600
Slovakia						4,759,000	4,690,000	4,887,000	4,955,000	4,606,000	5,270,000	5,534,000	5,886,000	5,519,900	5,506,600
Slovenia					1,151,000	958,000	1,709,000	1,639,000	1,629,000	1,662,000	1,594,000	1,563,000	1,721,000	1,962,000	2,003,000
Solomon Islands	310,000	311,000	330,000	330,000	330,000	330,000	628,000	734,000	734,000	734,000	734,000	734,000	734,000	554,000	554,000
Somalia	99,000	100,000	101,000	94,000	95,000	95,000	96,000	97,000	99,000	102,000	106,000	110,000	110,000	110,000	110,000
South Africa	12,283,000	12,283,000	13,008,000	12,601,000	15,273,000	15,154,000	17,118,000	18,176,000	18,176,000	18,571,000	18,616,000	18,616,000	18,616,000	18,616,000	18,616,000
Spain	13,103,000	15,691,000	13,790,000	12,988,000	11,624,000	11,429,000	12,988,000	12,997,000	12,433,000	12,433,000	13,164,000	13,160,000	12,721,000	13,276,000	13,850,000
Sri Lanka	695,000	710,900	657,700	636,700	655,700	660,700	668,700	686,700	693,700	699,700	631,000	636,000	676,000	694,000	694,000
Sudan	1,735,000	1,773,000	1,809,000	1,749,000	1,784,000	1,820,000	1,962,000	1,999,000	2,038,000	2,077,000	2,131,000	2,173,000	2,173,000	2,173,000	2,173,000
Suriname	215,000	114,700	106,000	97,300	112,000	90,000	104,000	103,000	213,000	181,000	145,000	98,000	177,000	163,000	154,000
Swaziland	1,221,000	975,000	964,000	964,000	964,000	931,000	931,000	934,000	934,000	934,000	330,000	330,000	330,000	330,000	330,000

Appendix 3 - Table 3-1

Production of industrial roundwood - m^3 under bark

Country	Year														
	1988	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Sweden	49,500,008	51,430,016	49,071,000	47,600,000	49,720,000	50,200,000	52,500,000	59,800,000	52,500,000	56,400,000	54,700,000	52,800,000	57,400,000	57,300,000	61,600,000
Switzerland	3,672,000	3,799,000	5,453,000	3,821,000	3,708,000	3,571,000	3,821,000	3,916,000	3,211,000	3,546,000	3,476,000	3,756,000	7,612,000	4,540,000	3,500,000
Syrian Arab Republic	64,200	40,550	40,700	62,500	56,500	34,500	34,500	34,500	34,500	34,500	34,500	34,500	34,500	34,500	34,500
Tajikistan					0	0	0	0	0	0	0	0	0	0	0
Tanzania, United Rep of	1,868,000	1,905,000	1,946,000	1,988,000	2,269,000	2,168,000	2,131,000	2,173,000	2,211,000	2,246,000	2,280,000	2,314,000	2,314,000	2,314,000	2,314,000
Thailand	4,571,000	3,483,000	3,093,000	2,866,000	2,783,000	2,756,000	2,779,000	2,775,000	2,813,000	2,845,000	2,872,000	2,893,000	6,262,000	7,101,000	7,800,000
Togo	170,000	173,000	185,000	186,800	191,000	197,000	211,000	236,000	247,000	319,000	287,000	314,000	306,000	235,000	208,000
Tonga	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600	3,900	2,100	2,100	2,100	2,100
Trinidad and Tobago	30,200	58,200	50,200	46,000	56,200	51,600	82,600	117,400	60,400	73,400	35,000	34,000	72,000	56,000	51,000
Tunisia	132,000	162,500	166,000	194,000	136,000	212,000	206,800	208,800	209,800	210,800	212,800	213,800	213,800	213,800	213,800
Turkey	6,309,000	5,728,000	5,960,000	5,502,000	8,458,000	9,408,000	9,211,000	10,745,000	10,229,000	9,773,000	9,979,000	10,065,000	10,429,000	9,976,000	11,305,000
Turkmenistan					0	0	0	0	0	0	0	0	0	0	0
Uganda	1,652,000	1,693,000	1,739,000	1,813,000	1,992,000	2,193,000	2,446,000	2,699,000	2,808,000	2,922,000	3,041,000	3,175,000	3,175,000	3,175,000	3,175,000
Ukraine					0	0	0	4,420,333	4,376,000	4,243,000	6,643,000	6,154,330	5,801,330	5,819,000	6,263,000
United Kingdom	5,881,000	6,207,000	6,125,000	6,122,000	6,183,000	6,481,000	7,249,000	7,323,000	6,861,000	7,250,000	7,027,000	7,248,000	7,247,000	7,325,000	7,142,000
United States of America	413,527,000	416,900,000	427,200,000	388,300,000	403,100,000	401,519,992	410,781,008	408,948,000	406,595,000	416,092,008	422,034,000	425,658,996	427,653,996	398,224,616	404,734,956
Uruguay	738,000	767,000	842,000	856,800	1,043,200	1,043,200	1,043,200	1,043,200	1,175,200	1,407,200	1,454,000	1,254,000	1,512,000	1,598,000	1,832,000
Uzbekistan					0	0	0	0	0	0	8,900	6,000	6,000	6,000	6,000
Vanuatu	39,200	39,200	39,200	39,200	39,200	39,200	39,200	39,200	39,200	39,200	33,800	41,000	40,000	28,000	28,000
Venezuela, Boliv Rep of	1,046,000	835,000	938,000	868,000	1,253,000	1,255,000	1,186,000	1,053,000	1,261,000	1,386,000	1,207,000	1,801,000	1,103,000	970,000	1,227,000
Viet Nam	5,094,000	4,932,000	4,669,000	4,846,000	4,464,000	4,349,000	4,387,000	4,802,000	4,877,000	4,557,000	4,326,000	3,525,000	4,183,000	4,183,000	4,183,000
Yugoslavia SFR	11,325,000	11,574,000	9,455,000	8,213,000											
Zambia	546,000	576,000	676,000	733,000	792,000	897,000	1,065,000	950,000	861,000	811,000	823,000	834,000	834,000	834,000	834,000
Zimbabwe	644,000	644,000	644,000	705,000	715,000	735,000	1,143,400	1,182,900	1,216,000	1,260,900	1,114,800	1,137,400	978,400	992,400	992,400

Appendix 3 - Table 3-2

Wood fuel production - m^3 under bark

Country	Year														
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
USSR	81,100,000	81,100,000	81,100,000	81,100,000											
Afghanistan	641,061	662,668	691,216	711,747	758,676	816,089	880,164	947,462	1,019,335	1,093,711	1,144,995	1,209,992	1,278,715	1,314,150	1,350,626
Albania	1,608,000	1,608,000	1,556,000	1,556,000	1,556,000	538,000	345,500	345,500	345,500	345,500	12,660	174,000	324,000	186,600	222,200
Algeria	5,387,499	5,470,653	5,639,620	5,810,128	5,949,453	6,150,578	6,324,009	6,429,825	6,549,969	6,713,169	6,824,915	6,948,087	7,074,136	7,188,295	7,304,790
Angola	2,203,194	2,268,878	2,342,007	2,412,874	2,483,879	2,744,559	2,790,763	2,810,266	2,839,907	2,902,919	2,982,339	3,071,098	3,163,217	3,240,601	3,320,271
Argentina	3,000,000	3,000,000	3,000,000	3,000,000	2,872,000	3,902,000	3,715,000	3,715,000	3,740,800	1,157,000	1,103,000	3,950,000	3,965,000	3,972,000	3,972,000
Armenia					0	0	0	0	0	62,200	0	0	57,400	42,000	46,000
Australia	3,051,433	3,298,064	3,545,312	3,786,530	4,020,352	4,251,357	4,490,496	4,742,499	5,017,892	5,297,933	5,636,923	5,974,408	6,332,782	6,707,306	7,104,416
Austria	2,734,000	2,680,000	2,613,000	2,437,000	2,994,000	3,149,000	3,259,000	3,059,000	3,797,000	3,423,000	3,175,000	3,095,000	2,860,000	2,905,000	3,036,000
Azerbaijan, Republic of					0	0	0	0	0	0	6,200	6,200	6,400	6,400	6,400
Bangladesh	27,523,272	27,765,424	27,742,092	27,875,808	27,922,598	27,928,152	27,923,674	27,940,264	27,904,236	27,866,072	27,850,996	27,842,852	27,835,888	27,798,728	27,762,752
Belarus					813,000	825,000	809,000	809,000	809,000	809,000	868,000	1,143,500	928,200	947,000	978,000
Belgium	0	0	0	0	0	0	0	0	0	0	0	550,000	550,000	550,000	550,000
Belgium-Luxembourg	572,000	572,000	550,000	550,000	550,000	550,000	550,000	500,000	500,000	550,000	550,000	0	0	0	0
Belize	126,000	126,000	126,000	126,000	126,000	126,000	126,000	126,000	126,000	126,000	126,000	126,000	126,000	126,000	126,000
Benin	5,404,507	5,524,776	5,579,160	5,625,505	5,676,375	5,737,187	5,782,932	5,827,711	5,859,531	5,893,853	5,882,337	5,895,592	5,910,329	5,937,375	5,965,969
Bhutan	3,778,030	3,836,123	3,855,112	3,869,728	3,875,221	3,872,204	3,875,639	3,888,601	3,919,649	3,971,899	4,065,712	4,142,468	4,220,796	4,283,723	4,347,714
Bolivia	1,888,294	1,908,689	1,921,379	1,935,526	1,959,183	1,979,024	1,999,080	2,021,186	2,045,276	2,068,039	2,091,065	2,116,050	2,141,914	2,162,520	2,183,753
Bosnia and Herzegovina					0	0	0	0	0	910,000	910,000	910,000	950,000	860,000	1,150,000
Botswana	611,014	603,736	603,128	602,131	602,829	612,869	617,330	623,598	627,466	629,902	627,897	630,891	635,448	639,809	644,515
Brazil	117,256,637	118,556,518	120,300,536	121,747,014	123,250,894	124,336,483	125,477,937	126,611,834	127,705,210	128,795,519	129,939,275	131,167,657	132,407,621	133,428,218	134,473,063
Brunei Darussalam	10,454	10,581	10,693	10,742	10,990	11,098	10,024	10,098	11,289	11,358	11,372	11,435	11,532	11,550	11,569
Bulgaria	795,000	1,527,000	1,503,000	1,450,000	1,870,000	1,710,000	887,000	874,000	1,185,000	1,179,000	1,388,333	1,101,000	2,107,000	1,635,000	2,187,000
Burkina Faso	8,774,914	8,961,290	9,241,999	9,356,953	9,625,190	9,907,919	10,186,787	10,356,823	10,489,460	10,634,823	10,781,856	7,228,000	7,402,000	11,241,529	11,400,265
Burundi	5,515,872	5,699,829	5,843,576	5,914,528	5,997,578	6,183,635	6,475,167	6,683,918	7,023,125	7,205,032	7,390,207	5,252,000	5,420,000	7,951,615	8,095,237
Cambodia	11,317,983	11,251,703	11,228,231	11,176,523	11,107,757	11,061,842	11,097,631	10,986,632	10,823,082	10,767,747	10,520,538	10,315,636	10,119,409	9,924,319	9,737,332
Cameroon	7,264,701	7,388,187	7,647,650	7,886,508	8,086,641	8,381,785	8,624,359	8,722,352	8,818,516	8,914,826	8,957,452	9,033,388	9,111,347	9,182,669	9,255,659
Canada	6,289,000	6,150,000	6,169,000	6,681,000	6,388,000	6,423,000	5,878,000	5,319,000	5,319,000	5,319,000	3,041,000	2,882,000	2,953,000	2,953,000	2,953,000
Central African Republic	3,055,000	3,055,000	3,055,000	3,055,000	3,250,000	3,250,000	3,000,000	3,000,000	2,606,000	2,687,000	2,687,000	2,000,000	2,000,000	2,000,000	2,000,000
Chad	4,461,060	4,508,689	4,615,498	4,670,285	4,804,273	4,986,899	5,099,095	5,198,506	5,320,887	5,443,676	5,593,879	5,737,619	5,885,198	6,000,676	6,118,605
Chile	7,127,000	7,169,000	7,699,000	8,194,797	9,016,000	9,321,000	9,666,000	9,700,011	10,449,000	10,407,000	10,415,000	10,794,000	12,131,000	12,108,000	12,326,139
China, Hong Kong SAR	105,161	105,789	106,433	106,748	110,159	104,964	91,880	92,589	107,678	108,379	105,445	104,633	103,829	102,026	100,255
China, Mainland	181,097,008	184,719,008	188,413,008	192,171,008	196,016,000	199,936,016	203,935,000	203,935,000	203,935,000	203,935,000	190,883,000	190,883,000	190,883,000	190,883,000	190,883,000
China, Taiwan Prov of	64,000	64,000	64,000	64,000	64,000	64,000	64,000	64,000	64,000	64,000	64,000	64,000	64,000	64,000	64,000
Colombia	6,626,598	6,702,489	6,765,607	6,871,886	6,937,426	6,982,250	7,016,583	7,055,319	7,141,448	7,208,619	7,390,511	8,194,000	10,893,000	10,760,000	9,598,000
Congo, Dem Republic of	40,709,092	42,329,276	44,183,460	46,675,932	49,802,248	53,799,496	56,745,960	58,758,544	60,143,368	61,299,800	62,405,724	63,639,720	64,902,848	66,080,688	67,285,264
Congo, Republic of	949,350	960,297	973,745	975,001	988,973	1,009,587	1,036,498	1,068,969	1,084,308	1,111,331	1,124,167	1,138,532	1,153,140	1,169,297	1,185,715
Costa Rica	3,541,569	3,537,432	3,546,921	3,554,496	3,528,027	3,506,913	3,495,860	3,496,032	3,516,958	3,507,328	3,500,294	3,492,653	3,486,321	3,474,232	3,463,401
Croatia					568,000	711,000	1,012,000	860,000	832,000	1,006,000	1,107,000	1,094,000	976,000	747,000	755,000
Cuba	2,347,000	2,145,000	2,587,189	2,687,488	2,794,509	2,928,712	2,944,961	2,946,722	2,907,932	2,906,457	2,880,669	1,187,000	963,000	888,000	2,810,097
Cyprus	14,300	14,300	14,800	12,100	11,200	13,900	11,100	10,900	9,900	9,700	8,315	8,039	5,430	6,555	5,212
Czech Republic						700,000	778,000	649,000	718,000	610,000	820,000	840,000	940,000	1,010,000	1,007,000
Czechoslovakia	1,532,000	1,376,000	1,782,000	1,519,000	0										
Côte d'Ivoire	7,353,320	7,445,332	7,577,441	7,858,389	8,138,127	8,437,984	8,674,489	8,781,280	8,739,961	8,688,262	8,616,379	8,569,477	8,529,021	8,552,092	8,580,962
Denmark	473,000	421,000	449,000	450,000	485,000	463,000	485,000	485,000	485,000	485,000	492,000	324,000	460,000	617,000	657,000
Djibouti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dominican Republic	556,000	556,000	556,000	556,000	556,000	556,000	556,000	556,000	556,000	556,000	556,000	556,000	556,000	556,000	556,000
Ecuador	3,046,000	3,079,000	3,113,000	3,141,000	3,175,000	3,500,000	4,524,000	4,850,000	5,048,000	5,420,000	4,832,925	4,977,819	5,129,495	5,200,709	5,274,042
Egypt	13,371,407	13,674,793	13,989,041	14,288,436	14,630,192	14,961,084	15,233,916	15,414,266	15,569,415	15,715,258	15,861,652	16,024,197	16,181,909	16,332,028	16,483,738
El Salvador	3,512,098	3,556,176	3,597,890	4,537,000	3,680,158	3,722,593	3,764,308	4,518,000	4,119,000	4,519,000	4,519,000	4,520,000	4,518,021	4,518,129	4,518,238

Appendix 3 - Table 3-2

Wood fuel production - m^3 under bark

Country	Year														
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Equatorial Guinea	447,000	447,000	447,000	447,000	447,000	447,000	447,000	447,000	447,000	447,000	447,000	447,000	447,000	447,000	447,000
Eritrea						1,728,855	1,794,280	1,850,230	1,917,608	1,993,911	2,074,017	2,157,479	2,244,341	2,283,552	2,323,498
Estonia					807,000	1,048,000	544,000	573,000	604,000	1,370,000	693,000	804,000	1,640,000	1,880,000	1,930,000
Ethiopia						76,337,074	78,550,402	80,231,664	81,220,592	83,106,686	84,134,597	85,785,168	87,471,092	88,824,543	90,201,752
Ethiopia PDR	66,828,092	69,095,773	70,915,723	74,426,000	77,372,810										
Fiji Islands	37,000	37,000	37,000	37,000	37,000	37,000	37,000	37,000	37,000	37,000	37,000	37,000	37,000	37,000	37,000
Finland	2,984,000	3,790,000	2,984,000	2,922,000	2,878,000	4,161,000	4,101,000	4,095,000	4,094,000	4,041,000	4,119,117	4,044,000	4,114,782	4,483,000	4,482,000
France	9,800,000	9,800,000	9,800,000	9,800,000	9,800,000	9,800,000	9,800,000	9,800,000	9,800,000	9,800,000	2,809,036	2,770,800	2,388,000	2,360,000	2,400,000
French Guiana	43,906	45,647	44,702	46,277	47,424	50,410	52,843	53,884	56,355	59,235	64,910	69,624	74,688	79,230	84,051
Gabon	447,228	448,906	451,989	453,411	464,479	467,357	491,691	496,650	500,841	505,318	507,057	511,155	515,409	517,740	520,173
Gambia	416,569	432,623	454,133	467,683	498,014	511,621	490,000	495,000	495,000	500,000	500,000	505,000	602,682	611,239	619,975
Georgia					0	0	0	0	0	0	0	0	0	0	0
Germany	4,282,000	4,366,000	4,366,000	3,795,000	3,795,000	3,795,000	3,795,000	2,429,000	2,476,000	2,719,000	2,611,000	2,571,000	2,622,000	2,981,000	4,625,000
Ghana	12,750,000	12,870,000	12,870,000	11,000,000	15,000,000	18,100,000	20,678,000	20,678,000	20,678,000	20,678,000	20,678,000	20,678,000	20,678,000	20,678,000	20,678,000
Greece	2,158,000	1,382,000	1,346,000	1,350,000	1,637,000	1,519,000	1,354,000	1,330,000	1,338,000	1,236,000	1,197,000	1,403,000	1,601,407	1,400,590	1,093,000
Guadeloupe	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
Guatemala	10,594,000	10,867,000	11,142,000	11,621,150	11,929,324	12,307,000	12,656,000	12,794,000	13,239,169	13,583,230	13,874,351	14,203,329	14,540,108	14,869,828	15,207,027
Guinea	9,454,752	9,629,687	9,884,241	10,305,439	7,625,000	7,715,000	7,931,000	11,933,290	12,000,683	7,980,000	8,000,000	11,575,899	11,444,377	11,489,757	11,536,722
Guinea-Bissau	422,000	422,000	422,000	422,000	422,000	422,000	422,000	422,000	422,000	422,000	422,000	422,000	422,000	422,000	422,000
Guyana	910,189	912,345	915,961	910,715	905,361	900,987	896,447	898,162	890,452	885,187	882,115	880,983	879,873	876,420	873,008
Haiti	1,582,599	1,603,660	1,628,210	1,662,817	1,741,004	1,775,722	1,841,155	1,906,814	1,923,644	1,944,371	1,945,913	1,954,712	1,963,646	1,970,701	1,977,872
Honduras	8,454,292	8,474,676	8,550,868	8,571,765	8,549,556	8,520,368	8,609,069	8,621,870	8,637,549	8,633,559	8,657,936	8,694,370	8,732,405	8,719,959	8,710,323
Hungary	2,865,000	2,860,000	2,455,000	2,291,000	2,175,000	2,230,000	2,066,000	1,948,000	1,853,000	1,909,000	1,871,000	2,475,000	2,596,900	2,319,000	2,398,200
Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
India	268,141,717	271,942,630	276,239,233	281,733,997	283,869,843	286,636,600	288,003,499	288,524,116	277,380,016	277,380,016	277,380,016	277,380,016	277,380,016	277,380,016	300,564,047
Indonesia	135,747,952	130,814,440	126,043,496	120,775,584	115,665,920	110,699,096	105,623,464	100,354,872	95,894,688	93,555,984	91,892,016	90,416,944	88,981,128	85,712,072	82,555,752
Iran, Islamic Rep of	289,000	367,000	326,000	363,000	338,000	357,000	355,000	307,000	287,000	286,000	227,000	189,000	54,000	263,923	257,253
Iraq	35,858	36,400	39,887	46,366	46,799	46,837	47,475	48,216	49,336	111,000	118,000	51,132	51,309	52,294	53,298
Ireland	50,000	50,000	50,000	50,000	50,000	57,000	60,000	64,000	66,000	63,000	73,000	73,000	73,000	32,000	34,000
Israel	11,000	6,600	13,000	13,000	13,000	13,000	13,000	13,000	10,000	14,000	13,000	13,000	8,012	2,043	2,043
Italy	4,357,000	4,111,000	3,637,000	4,239,000	4,832,000	4,698,000	5,481,000	5,263,000	4,958,000	5,222,000	5,183,000	6,925,000	5,680,000	5,150,000	4,567,000
Jamaica	783,000	790,000	853,000	750,000	500,000	450,000	400,000	300,000	491,811	524,215	547,287	572,421	598,710	591,425	584,228
Japan	355,000	104,000	103,000	168,000	162,000	138,000	162,442	159,019	749,000	777,000	264,000	308,000	133,621	128,538	123,648
Jordan	116,210	127,798	133,680	141,544	144,417	151,602	158,128	165,047	173,028	143,759	204,946	213,365	222,143	229,544	237,198
Kazakhstan					486,000	340,000	331,000	339,000	315,000	315,000	0	0	0	0	0
Kenya	16,050,412	16,420,361	16,792,606	17,247,700	17,753,655	18,217,617	18,555,475	18,866,384	19,120,528	19,399,053	19,386,779	19,520,854	19,658,247	19,826,903	20,001,528
Korea, Dem People's Rep	4,197,770	4,301,471	4,362,858	4,482,871	4,632,934	4,755,471	4,855,280	4,987,452	5,145,141	5,306,348	5,356,356	5,429,281	5,502,863	5,561,040	5,619,539
Korea, Republic of	2,767,143	2,759,876	2,733,618	2,662,479	2,610,825	2,557,653	2,495,055	2,429,736	2,429,927	2,435,415	2,438,248	2,444,075	2,449,237	2,453,806	2,457,638
Kyrgyzstan					0	0	0	0	0	30,000	0	0	20,000	16,000	16,000
Laos	5,618,899	5,592,825	5,627,031	5,679,100	5,692,817	5,715,513	5,715,053	5,730,394	5,764,594	5,797,929	5,814,598	5,842,782	5,871,960	5,885,008	5,898,734
Latvia					700,000	1,100,000	1,110,000	1,210,000	2,530,000	2,864,000	2,845,000	2,490,000	1,680,000	1,580,000	1,198,000
Lebanon	63,515	65,619	67,156	65,377	73,130	75,854	78,042	80,032	81,922	83,313	82,805	18,081	19,074	82,276	82,043
Lesotho	1,873,572	1,871,503	1,262,000	1,329,000	1,366,000	1,402,000	1,440,000	1,478,000	1,517,000	1,556,000	1,594,000	2,004,030	2,022,018	2,028,134	2,034,269
Liberia	3,343,922	3,448,405	3,452,701	3,342,818	3,118,810	2,880,524	2,732,488	2,747,818	2,951,440	3,326,808	3,736,394	4,201,839	4,725,361	4,924,930	5,132,953
Libyan Arab Jamahiriya	536,000	536,000	536,000	536,000	536,000	536,000	536,000	536,000	536,000	536,000	536,000	536,000	536,000	536,000	536,000
Liechtenstein	0	0	0	0	0	0	0	4,000	4,000	4,000	4,000	4,167	4,167	4,167	4,167
Lithuania					1,376,000	1,780,000	1,736,000	1,090,000	1,230,000	1,149,000	1,170,000	1,124,000	1,450,000	1,480,000	1,440,000
Luxembourg	0	0	0	0	0	0	0	0	0	0	0	18,000	18,000	6,720	4,230
Macedonia,The Fmr Yug Rp					0	697,000	611,000	610,000	616,000	616,000	542,500	699,000	875,000	605,000	603,000
Madagascar	5,973,183	6,259,081	7,379,000	7,736,000	8,109,000	8,497,000	8,900,000	9,321,000	9,760,000	8,836,594	9,077,379	9,357,077	9,637,458	9,919,542	10,202,298

Appendix 3 - Table 3-2

Wood fuel production - m^3 under bark

Country	Year														
	1988	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Malawi	4,898,173	5,141,863	5,164,443	5,122,063	5,207,139	4,988,708	5,101,330	4,896,283	4,801,751	4,827,059	4,881,301	4,921,718	4,964,075	4,995,659	5,029,117
Malaysia	4,171,306	4,092,483	4,009,672	3,930,693	3,852,490	3,764,866	3,681,176	3,596,065	3,525,162	3,458,370	3,413,572	3,381,880	3,345,720	3,285,527	3,227,802
Mali	3,825,536	3,829,439	3,942,129	4,088,880	4,136,294	4,272,162	4,376,565	4,433,947	4,522,299	4,580,575	4,612,207	4,670,820	4,730,585	4,787,528	4,845,581
Malta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Martinique	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Mauritania	1,096,683	1,114,493	1,151,410	1,176,562	1,206,282	1,226,267	1,250,416	1,272,675	1,298,050	1,322,209	1,358,756	1,392,752	1,428,069	1,464,448	1,502,040
Mauritius	20,800	16,500	16,000	3,200	3,200	11,400	7,500	6,200	6,500	6,500	10,000	12,000	10,000	9,000	9,000
Mexico	33,731,946	34,084,336	34,371,305	34,604,851	34,909,787	35,364,796	35,585,015	36,480,304	36,791,478	36,965,080	37,098,925	37,332,888	37,560,508	37,736,319	37,912,958
Moldova, Republic of					0	0	0	0	326,000	356,000	356,000	35,800	29,500	29,500	29,500
Mongolia	777,000	771,000	609,000	263,000	251,600	251,600	227,000	186,000	186,000	186,000	186,000	186,000	186,000	186,000	186,000
Morocco	6,469,912	6,526,540	6,552,536	6,567,145	6,697,786	6,788,404	560,000	610,000	526,000	320,000	770,000	553,000	487,000	406,000	400,000
Mozambique	14,422,000	14,641,000	14,825,000	15,079,000	15,398,000	15,782,000	16,226,000	16,724,000	16,724,000	16,724,000	16,724,000	16,724,000	16,724,000	16,724,000	16,724,000
Myanmar	16,999,000	17,324,000	17,645,000	17,501,000	17,699,000	17,892,000	18,088,000	18,295,000	18,515,000	31,497,000	32,150,000	34,223,000	34,471,000	35,403,000	35,403,000
Nepal	12,292,376	12,346,772	12,396,872	12,346,377	12,391,321	12,482,333	12,413,873	12,481,351	12,499,471	12,570,994	12,593,479	12,678,496	12,762,684	12,744,224	12,727,933
Netherlands	110,000	110,000	145,000	127,000	161,000	175,000	180,000	163,000	123,000	123,000	150,000	162,000	160,000	136,000	136,000
New Zealand	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	0	0	0	0	0	0
Nicaragua	5,573,102	5,597,563	5,628,677	5,624,608	5,624,848	5,651,015	5,648,512	5,618,319	5,622,972	5,617,073	5,678,797	5,716,523	5,755,725	5,790,653	5,827,356
Niger	5,294,825	5,532,795	5,674,499	5,861,030	6,186,498	6,412,932	6,609,722	6,822,681	7,039,212	7,259,438	7,422,174	7,611,274	7,805,433	2,857,000	8,190,443
Nigeria	50,645,764	50,786,024	50,916,960	51,733,968	52,854,280	54,030,624	55,524,128	56,765,876	57,672,528	58,661,088	58,417,792	58,873,676	59,348,652	59,697,552	60,064,328
Norway	936,000	918,000	919,000	934,000	934,000	457,000	470,000	470,000	467,000	299,000	501,800	717,000	678,475	1,111,800	1,188,700
Pakistan	20,204,607	20,633,032	21,043,012	21,369,992	21,575,027	21,986,253	22,352,600	22,682,706	26,920,000	28,590,000	29,515,000	30,670,000	30,880,000	30,553,000	25,012,679
Panama	1,410,839	1,416,283	1,408,745	1,384,095	1,362,814	1,349,056	1,339,478	1,332,878	1,326,012	1,314,584	1,301,168	1,290,191	1,279,654	1,263,760	1,248,388
Papua New Guinea	5,533,000	5,533,000	5,533,000	5,533,000	5,533,000	5,533,000	5,533,000	5,533,000	5,533,000	5,533,000	5,533,000	5,533,000	5,533,000	5,533,000	5,533,000
Paraguay	4,716,157	4,757,634	4,840,835	4,913,346	4,975,956	5,071,666	5,165,333	5,279,666	5,346,089	5,423,784	5,464,861	5,507,823	5,550,923	5,646,197	5,743,375
Peru	7,591,000	7,639,000	6,518,000	6,735,000	6,868,000	6,836,000	7,519,000	6,629,000	6,512,000	7,291,000	7,328,000	7,625,000	7,777,000	7,299,000	7,335,000
Philippines	15,763,357	15,412,616	15,175,941	15,063,075	14,949,094	14,791,737	14,582,962	14,359,281	37,445,000	38,301,000	39,156,000	40,011,000	40,950,000	41,699,000	13,328,084
Poland	2,967,000	2,274,000	2,068,000	2,692,000	3,058,000	2,650,000	2,065,000	1,411,000	1,463,000	1,538,000	1,314,000	1,426,000	1,536,000	1,641,000	2,130,000
Portugal	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	550,000	550,000	600,000	600,000	600,000	600,000	600,000
Romania	3,150,000	2,100,000	1,883,000	2,000,000	2,000,000	1,100,000	2,285,000	2,163,000	2,809,000	3,692,000	3,020,000	3,220,000	3,032,200	2,618,000	3,062,000
Russian Federation					63,900,000	38,600,000	32,020,000	33,460,000	23,809,000	46,290,000	17,600,000	49,000,000	52,300,000	46,900,000	48,800,000
Rwanda	5,602,000	6,368,000	3,000,000	3,000,000	3,000,000	3,000,000	2,500,000	5,148,000	5,550,000	7,100,000	7,200,000	7,500,000	7,500,000	7,500,000	7,500,000
Réunion	31,000	31,000	31,000	31,000	31,000	31,000	31,000	31,000	31,000	31,000	31,000	31,000	31,000	31,000	31,000
Samoa	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000
Senegal	4,559,480	4,642,854	4,687,260	4,741,308	4,802,288	4,876,768	4,921,875	4,908,122	4,962,440	5,024,665	5,053,251	5,083,253	5,113,579	5,145,395	5,177,559
Serbia and Montenegro					1,573,000	1,648,000	1,502,000	1,664,000	1,715,000	1,523,000	1,432,000	1,282,000	1,772,000	1,276,900	1,650,000
Sierra Leone	4,795,401	4,767,666	4,688,850	4,591,401	4,559,816	4,482,874	4,402,114	4,610,873	4,600,674	4,952,592	5,080,258	5,215,230	5,357,763	5,363,942	5,373,620
Slovakia						490,000	628,000	436,000	505,000	339,000	249,000	261,000	277,000	268,000	258,800
Slovenia					520,000	107,000	235,000	227,000	362,000	546,000	539,000	505,000	532,000	295,000	280,000
Solomon Islands	134,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000	138,000
Somalia	6,008,706	6,126,105	6,264,327	6,484,632	6,966,111	7,106,103	7,291,645	7,539,311	7,858,141	8,243,437	8,534,677	8,874,382	9,228,017	9,522,271	9,826,520
South Africa	11,000,000	11,400,000	11,800,000	12,200,000	12,600,000	13,000,000	13,400,000	13,800,000	14,200,000	14,600,000	12,000,000	12,000,000	12,000,000	12,000,000	12,000,000
Spain	1,659,000	2,200,000	1,800,000	2,200,000	2,300,000	2,338,000	2,317,000	3,078,000	3,198,000	3,198,000	1,710,000	1,650,000	1,600,000	1,855,000	1,989,000
Sri Lanka	6,360,056	6,379,928	6,349,349	9,226,000	9,002,000	9,235,000	9,580,000	9,726,000	9,708,000	6,059,962	6,004,545	5,955,165	5,906,561	5,839,928	5,774,369
Sudan	16,043,540	15,965,830	16,286,247	16,521,308	16,261,849	16,163,566	16,163,825	16,263,334	16,322,297	16,304,113	16,421,949	16,548,511	16,680,060	16,871,138	17,068,332
Suriname	34,010	37,842	38,367	38,679	37,801	40,801	41,819	41,794	41,803	42,335	42,284	42,491	42,700	43,120	43,545
Swaziland	560,000	560,000	560,000	560,000	560,000	560,000	560,000	560,000	560,000	560,000	560,000	560,000	560,000	560,000	560,000
Sweden	4,400,000	4,400,000	3,800,000	3,800,000	3,800,000	3,800,000	3,800,000	3,800,000	3,800,000	3,800,000	5,900,000	5,900,000	5,900,000	5,900,000	5,900,000
Switzerland	893,000	813,000	879,000	786,000	845,000	836,000	858,000	833,000	853,000	940,000	800,000	980,000	1,626,000	1,122,000	950,000
Syrian Arab Republic	10,000	11,300	8,900	18,300	21,160	15,900	15,900	15,900	15,900	15,900	15,900	15,900	15,900	15,900	15,900
Tajikistan					0	0	0	0	0	0	0	0	0	0	0

Appendix 3 - Table 3-2

Wood fuel production - m^3 under bark

Country	Year														
	1988	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Tanzania, United Rep of	18,359,400	18,424,256	18,567,195	18,921,098	19,432,612	19,841,753	20,163,261	20,435,063	20,591,740	20,697,360	20,678,131	20,737,167	20,786,647	20,950,514	21,124,758
Thailand	22,290,888	22,059,744	21,806,980	21,629,036	21,428,982	21,198,400	20,960,032	20,725,478	20,539,536	20,548,376	20,548,828	20,547,552	20,552,514	20,396,336	20,250,008
Timor-Leste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Togo	4,388,501	4,466,109	4,581,292	4,710,859	4,873,918	5,142,345	5,179,470	5,220,040	5,238,954	5,309,158	5,364,300	5,430,924	5,499,189	5,549,194	5,600,447
Trinidad and Tobago	40,088	40,017	39,747	39,484	39,437	39,674	39,265	38,914	37,273	37,922	37,218	36,809	36,515	36,084	35,664
Tunisia	1,838,370	1,877,733	1,888,970	1,917,042	1,925,675	1,960,165	1,989,593	2,024,631	2,036,979	2,057,139	2,065,541	2,079,691	2,094,053	2,104,720	2,115,517
Turkey	10,475,000	9,796,000	9,796,000	9,750,000	8,495,000	9,469,000	7,634,000	8,534,000	9,182,000	8,277,000	7,689,000	7,550,000	6,358,000	6,186,000	7,160,000
Turkmenistan					0	0	0	0	0	0	0	0	0	0	0
Uganda	28,573,012	28,856,856	29,265,482	29,865,918	30,679,212	31,225,080	31,932,026	32,181,392	32,622,348	33,045,024	33,368,100	33,726,320	34,090,320	34,611,016	35,141,824
Ukraine					0	0	0	1,898,000	1,876,000	1,810,000	1,810,000	1,766,000	4,058,000	4,070,000	4,381,000
United Kingdom	160,000	220,000	225,000	250,000	225,000	230,000	230,000	232,000	232,000	232,000	233,000	234,000	234,000	234,000	233,000
United States of America	93,400,000	96,100,000	82,900,000	90,300,000	90,300,000	87,272,000	87,657,000	90,362,000	83,976,000	69,788,000	71,982,000	71,982,000	72,520,000	72,803,008	73,086,175
Uruguay	3,085,055	2,949,974	3,072,111	3,159,773	3,161,675	3,379,603	3,435,173	3,509,431	3,563,374	3,614,978	3,721,459	3,806,672	3,894,131	3,983,674	4,075,646
Uzbekistan					0	0	0	0	0	0	24,277	18,980	18,980	18,980	18,980
Vanuatu	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	91,000	91,000	91,000	91,000
Venezuela, Boliv Rep of	2,812,747	2,963,509	2,990,333	2,987,726	3,018,825	3,095,439	3,197,420	3,252,961	3,329,602	3,352,202	3,431,777	3,516,840	3,604,654	3,650,299	3,696,911
Viet Nam	26,092,416	26,233,044	26,534,428	26,708,368	26,752,296	26,814,060	26,828,012	26,793,304	26,764,126	26,767,706	26,706,974	26,695,324	26,685,548	26,615,186	26,546,500
Yemen	162,639	166,297	173,220	187,319	202,586	216,084	232,822	247,729	258,480	268,709	278,488	289,934	301,896	313,823	326,262
Yugoslavia SFR	3,783,000	3,967,000	3,231,000	3,200,000											
Zambia	5,775,000	6,192,000	6,398,000	6,604,000	6,809,000	7,015,000	7,219,000	7,219,000	7,219,000	7,219,000	7,219,000	7,219,000	7,219,000	7,219,000	7,219,000
Zimbabwe	6,260,200	6,260,200	6,260,200	6,260,200	6,260,200	6,260,200	7,000,200	7,210,200	7,426,200	7,649,200	7,879,200	8,115,200	8,115,200	8,115,200	8,115,200

Appendix 4. Historical exchange rates (Source: IMF)

Country	*	Currency	1988	1989	1990	1991	1992	1998	1999	2000	2001	2002	2003
Afghanistan	PR	Afgani	50.60	50.60	50.60	50.60	50.60	3000	3000	3000	3000	3000	3000
Albania	MR	Lek	n.a.	n.a.	n.a.	n.a.	102.90	140.58	135.12	142.64	136.55	133.74	106.58
Algeria	OR	Dinar	6.731	8.032	12.191	21.392	22.781	60.353	69.314	75.343	77.820	79.724	72.613
Angola	OR	Kwanza	2.9918E-08	2.9918E-08	2.9918E-08	1.8E-07	0.00000055	0.696500075	5.580	16.818	31.949	58.666	79.082
Anguilla	OR	Dollar	2.700	2.700	2.700	2.700	2.700	2.700	2.700	2.700	2.700	2.700	2.700
Antigua and Barbuda	OR	Dollar	2.700	2.700	2.700	2.700	2.700	2.700	2.700	2.700	2.700	2.700	2.700
Argentina	OR	Peso	0.00134	0.17950	0.55850	0.99850	0.99050	0.99950	0.99950	0.99950	0.99950	3.32000	2.90500
Armenia	OR	Dram	n.a.	n.a.	n.a.	n.a.	2.07	522.03	523.77	552.18	561.81	584.89	566.00
Aruba	OR	Florin	1.790	1.790	1.790	1.790	1.790	1.790	1.790	1.790	1.790	1.790	1.790
Australia	MR	Dollar	1.169	1.262	1.293	1.316	1.452	1.629	1.530	1.805	1.958	1.766	1.333
Azerbaijan	OR	Manat	n.a.	n.a.	n.a.	n.a.	48.60	3890.00	4378.00	4565.00	4775.00	4893.00	4923.00
Bahamas	PR	Dollar	1	1	1	1	1	1	1	1	1	1	1
Bahrain	OR	Dinar	0.3760	0.3760	0.3760	0.3760	0.3760	0.3760	0.3760	0.3760	0.3760	0.3760	0.3760
Bangladesh	PR	Taka	32.27	32.27	35.79	38.58	39.00	48.50	51.00	54.00	57.00	57.90	58.78
Barbados	OR	Dollar	2	2	2	2	2	2	2	2	2	2	2
Belarus	OR	Rubel	n.a.	n.a.	n.a.	n.a.	0.01500	220.00	320.00	1180.00	1580.00	1920.00	n.a.
Belize	OR	Dollar	2	2	2	2	2	2	2	2	2	2	2
Benin	OR	Franc	302.95	289.40	256.45	259.00	275.33	562.21	652.95	704.95	744.31	625.50	519.36
Bhutan	OR	Trum	14.95	17.04	18.07	25.83	26.20	42.48	43.49	46.75	48.18	48.03	45.61
Bolivia	MR	Boliviano	2.470	2.980	3.400	3.745	4.095	5.645	5.990	6.390	6.820	7.490	7.830
Bosnia & Herzegovina	MR	Marka	n.a.	n.a.	n.a.	n.a.	n.a.	1.673	1.947	2.102	2.219	1.865	1.549
Botswana	OR	Pula	1.936	1.872	1.871	2.073	2.257	4.458	4.632	5.362	6.983	5.467	4.442
Brazil	MR	Real	2.78291E-07	4.13018E-06	6.43854E-05	0.000388654	0.004504545	1.208703	1.789000	1.954602	2.320403	3.532497	2.888403
Bulgaria	MR	Lev	0.000821	0.000821004	0.002842	0.021810994	0.024492	1.675099	1.946900	2.101903	2.219299	1.885004	1.548598
Burkina Faso	OR	Franc	302.95	289.40	256.45	259.00	275.33	562.21	652.95	704.95	744.31	625.50	519.36
Burundi	OR	Franc	149.36	176.65	163.17	190.90	234.84	504.71	627.19	778.84	868.06	1067.34	1081.55
Cambodia	MR	Riel	n.a.	216.00	600.00	520.00	2000.00	3770.00	3770.00	3905.00	3895.00	3930.00	3984.00
Cameroon	OR	Franc	302.95	289.40	256.45	259.00	275.33	562.21	652.95	704.95	744.31	625.50	519.36
Canada	MR	Dollar	1.193	1.158	1.160	1.156	1.271	1.531	1.443	1.500	1.593	1.580	1.292
Cape Verde	OR	Escudo	73.67	73.04	66.09	66.47	73.09	94.26	109.77	118.51	125.12	105.15	87.31
Central African Rep.	OR	Franc	302.95	289.40	256.45	259.00	275.33	562.21	652.95	704.95	744.31	625.50	519.36
Chad	OR	Franc	302.95	289.40	256.45	259.00	275.33	562.21	652.95	704.95	744.31	625.50	519.36
Chile	PR	Peso	247.49	296.58	336.86	374.87	382.33	473.77	530.07	572.68	656.20	712.38	599.42
China,P.R.: Mainland	PR	Yuan	3.722	4.722	5.222	5.434	5.752	8.279	8.280	8.277	8.277	8.277	8.277
China,P.R.:Hong Kong	MR	Dollar	7.808	7.807	7.801	7.781	7.743	7.746	7.771	7.796	7.797	7.798	7.763
China,P.R.:Macao	MR	Pataca	8.043	8.041	8.034	8.014	7.972	7.980	8.005	8.034	8.031	8.033	7.997
Colombia	OR	Peso	335.86	433.92	568.73	706.86	811.77	1507.52	1873.77	2187.02	2301.33	2864.79	2780.82
Comoros	OR	Franc	302.95	289.40	256.45	259.00	275.32	421.66	489.72	528.71	558.23	469.12	389.52
Congo, Dem. Rep. of	MR	Franc	9.13331E-10	1.5154E-09	6.66667E-09	2.12243E-07	6.63333E-06	2.450	4.500	50.00	313.60	382.14	n.a.
Congo, Republic of	OR	Franc	302.95	289.40	256.45	259.00	275.33	562.21	652.95	704.95	744.31	625.50	519.36

Appendix 4. Historical exchange rates (Source: IMF)

Country		Currency	1988	1989	1990	1991	1992	1998	1999	2000	2001	2002	2003
Costa Rica	MR	Colon	79.50	84.35	103.55	135.43	137.43	271.42	298.19	318.02	341.67	378.72	418.53
Côte d'Ivoire	OR	Franc	302.95	289.40	256.45	259.00	275.33	562.21	652.95	704.95	744.31	625.50	519.36
Croatia	MR	Kuna	n.a.	n.a.	n.a.	n.a.	0.80	6.25	7.65	8.16	8.36	7.15	6.12
Cyprus	OR	Pound	0.4663	0.4788	0.4346	0.4390	0.4830	0.4982	0.5746	0.6168	0.6502	0.5468	0.4652
Czech Republic	OR	Koruna	n.a.	n.a.	n.a.	n.a.	n.a.	29.85	35.98	37.81	36.26	30.14	25.65
Denmark	MR	Krone	6.874	6.607	5.776	5.914	6.255	6.386	7.399	8.021	8.410	7.082	5.958
Djibouti	OR	Franc	177.72	177.72	177.72	177.72	177.72	177.72	177.72	177.72	177.72	177.72	177.72
Dominica	OR	Dollar	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Dominican Republic	PR	Peso	6.340	6.340	11.350	12.660	12.575	15.788	16.039	16.674	17.149	21.194	37.250
Ecuador	PR	Sucre	432.51	648.42	878.20	1270.58	1844.25	6825.00	20242.99	24999.96	24999.96	25000.00	24999.97
Egypt	PR	Pound	0.700	1.100	2.000	3.332	3.339	3.388	3.405	3.690	4.490	4.500	6.153
El Salvador	PR	Colon	5.000	5.000	8.030	8.080	9.170	8.755	8.755	8.755	8.750	8.750	8.750
Equatorial Guinea	OR	Franc	302.95	289.40	256.45	259.00	275.33	562.21	652.95	704.95	744.31	625.50	519.36
Eritrea	OR	Nafka	2.070	2.070	2.070	2.070	5.000	7.597	9.600	10.200	13.797	14.131	n.a.
Estonia	OR	Kroon	n.a.	n.a.	n.a.	n.a.	12.91	13.41	15.56	16.82	17.69	14.94	12.41
Ethiopia	OR	Birr	2.070	2.070	2.070	2.070	5.000	7.503	8.134	8.314	8.558	8.581	n.a.
Euro Area	MR	EMU Euro	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.995	1.075	1.135	0.954	0.792
Fiji	OR	Dollar	1.405	1.494	1.459	1.473	1.564	1.986	1.966	2.186	2.309	2.065	1.722
Gabon	OR	Franc	302.95	289.40	256.45	259.00	275.33	562.21	652.95	704.95	744.31	625.50	519.36
Gambia	MR	Dalasi	6.659	8.315	7.495	8.957	9.217	10.991	11.547	14.888	16.932	23.392	n.a.
Georgia	OR	Lari	n.a.	n.a.	n.a.	n.a.	n.a.	1.80	1.93	1.98	2.06	2.09	2.08
Ghana	PR	Cedi	229.88	303.03	344.83	390.63	520.83	2325.58	3535.14	7047.65	7321.94	8438.79	n.a.
Grenada	OR	Dollar	2.700	2.700	2.700	2.700	2.700	2.700	2.700	2.700	2.700	2.700	2.700
Guatemala	MR	Quetzal	2.705	3.400	5.015	5.043	5.274	6.848	7.821	7.731	8.000	7.807	8.041
Guinea	MR	Franc	550.00	620.00	680.00	802.95	922.41	1298.03	1736.00	1882.27	1988.33	1927.28	n.a.
Guinea-Bissau	OR	Franc	20.97	30.57	38.59	76.29	133.16	562.21	652.95	704.95	744.31	625.50	519.36
Guyana	PR	Dollar	10.00	33.00	45.00	122.00	126.00	162.25	180.50	184.75	189.50	191.75	n.a.
Haiti	PR	Gourde	4.999	4.999	4.999	8.240	10.953	16.505	17.965	22.524	26.339	37.609	n.a.
Honduras	PR	Lempira	2.000	2.000	5.357	5.400	5.830	13.808	14.504	15.141	15.920	16.923	17.75
Hungary	OR	Forint	52.54	62.54	61.45	75.62	83.97	219.03	252.52	284.73	279.03	225.16	207.92
Iceland	OR	Krona	46.22	61.17	55.39	55.62	63.92	69.32	72.55	84.70	102.95	80.58	70.99
India	MR	Rupee	14.95	17.04	18.07	25.83	26.20	42.48	43.49	46.75	48.18	48.03	45.61
Indonesia	MR	Rupiah	1731.00	1797.00	1901.00	1992.00	2062.00	8024.97	7085.00	9594.98	10400.01	8939.99	8464.98
Iran	OR	Rial	68.59	70.23	64.88	64.53	67.13	1750.93	1752.29	2262.93	1750.95	7952.00	8272.11
Iraq	PR	Dinar	0.3109	0.3109	0.3109	0.3109	0.3109	0.3109	0.3109	0.3109	0.3109	0.3109	n.a.
Israel	MR	Shequel	1.685	1.963	2.048	2.283	2.764	4.161	4.153	4.041	4.416	4.737	4.379
Jamaica	MR	Dollar	5.480	6.480	8.038	21.49	22.18	37.05	41.29	45.41	47.29	50.76	60.52
Japan	MR	Yen	125.85	143.45	134.40	125.20	124.75	115.60	102.20	114.90	131.80	119.90	107.10
Jordan	OR	Dinar	0.4770	0.6480	0.6650	0.6750	0.6910	0.7090	0.7090	0.7090	0.7090	0.7090	0.7090
Kazakhstan	OR	Tenge	n.a.	n.a.	n.a.	n.a.	n.a.	83.80	138.20	144.50	150.20	154.60	144.22

Appendix 4. Historical exchange rates (Source: IMF)

Country		Currency	1988	1989	1990	1991	1992	1998	1999	2000	2001	2002	2003
Kenya	OR	Shilling	18.60	21.60	24.08	28.07	36.22	61.91	72.93	78.04	78.60	77.07	76.14
Kiribati	OR	Dollar	1.169	1.262	1.293	1.316	1.452	1.629	1.530	1.805	1.958	1.766	1.333
Korea	MR	Won	684.10	679.60	716.40	760.80	788.40	1204.00	1138.00	1264.50	1313.50	1186.20	1192.60
Kuwait	OR	Dinar	0.2826	0.2920	n.a.	0.2843	0.3027	0.3016	0.3042	0.3054	0.3079	0.2996	0.2947
Kyrgyz Republic	OR	Som	n.a.	n.a.	n.a.	n.a.	n.a.	29.38	45.43	48.30	47.72	46.09	44.19
Lao	MR	Kip	452.50	713.50	695.50	711.50	717.00	4274.00	7600.02	8217.99	9490.03	10680.02	n.a.
Latvia	OR	Lats	n.a.	n.a.	n.a.	n.a.	0.83	0.57	0.58	0.61	0.64	0.59	0.54
Lebanon	MR	Pound	530.00	505.00	842.00	879.00	1838.00	1508.00	1507.50	1507.50	1507.50	1507.50	1507.50
Lesotho	PR	Loti	2.378	2.536	2.563	2.743	3.053	5.860	6.154	7.568	12.126	8.640	6.640
Liberia	PR	Dollar	1.00	1.00	1.00	1.00	1.00	43.25	39.50	42.75	49.50	65.00	n.a.
Libya	OR	Dinar	0.2853	0.2922	0.2699	0.2684	0.3013	0.4504	0.4620	0.5403	0.6501	1.2098	1.3004
Lithuania	OR	Litas	n.a.	n.a.	n.a.	n.a.	3.790	4.000	4.000	4.000	4.000	3.311	2.762
Macedonia, FYR	MR	Denar	n.a.	n.a.	n.a.	n.a.	n.a.	51.84	60.34	66.33	69.17	58.60	n.a.
Madagascar	OR	Franc	1526.43	1532.54	1465.83	1832.66	1910.17	5402.21	6543.20	6550.44	6631.19	6434.77	6021.30
Malawi	OR	Kwacha	2.535	2.679	2.647	2.664	4.396	43.884	46.438	80.076	67.294	87.139	n.a.
Malaysia	OR	Ringgit	2.715	2.703	2.702	2.724	2.612	3.800	3.800	3.800	3.800	3.800	3.800
Maldives	MR	Rufiyaa	8.525	9.205	9.620	10.320	10.535	11.770	11.770	11.770	12.800	12.800	12.800
Mali	OR	Franc	302.95	289.40	256.45	259.00	275.33	562.21	652.95	704.95	744.31	625.50	519.36
Malta	OR	Lira	0.3321	0.3369	0.3008	0.3056	0.3742	0.3774	0.4121	0.4378	0.4521	0.3988	0.3425
Mauritania	MR	Ouguiya	75.73	83.55	77.84	77.82	115.10	205.78	225.00	252.30	264.12	268.71	n.a.
Mauritius	MR	Rupee	13.83	15.00	14.32	14.79	17.00	24.78	25.47	27.88	30.39	29.20	26.09
Mexico	PR	Peso	2.281	2.641	2.945	3.071	3.115	9.865	9.514	9.572	9.142	10.312	11.236
Moldova	OR	Lev	n.a.	n.a.	n.a.	0.00170	0.41450	8.323	11.590	12.383	13.091	13.822	13.220
Mongolia	MR	Togrog	n.a.	n.a.	14.00	39.40	105.07	902.00	1072.37	1097.00	1102.00	1125.00	n.a.
Montserrat	OR	Dollar	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Morocco	OR	Dirham	8.211	8.122	8.043	8.150	9.049	9.255	10.087	10.619	11.560	10.167	8.75
Mozambique	PR	Metical	623.97	816.80	1034.46	1838.84	2940.95	12322.18	13252.87	17140.48	23320.44	23854.30	23856.67
Myanmar	OR	Kyat	6.323	6.474	5.981	5.948	6.188	6.043	6.199	6.530	6.770	6.258	5.726
Namibia	OR	Dollar	2.378	2.536	2.563	2.743	3.053	5.860	6.154	7.568	12.126	8.640	6.640
Nepal	OR	Rupee	25.20	28.60	30.40	42.70	43.20	67.67	68.72	74.30	76.47	78.30	74.04
Netherlands Antilles	OR	Guilder	1.800	1.790	1.790	1.790	1.790	1.790	1.790	1.790	1.790	1.790	1.790
New Zealand	MR	Dollar	1.592	1.674	1.701	1.848	1.944	1.898	1.921	2.272	2.407	1.899	1.528
Nicaragua	PR	Córdoba	0.0002	0.0076	0.6000	5.000	5.000	11.194	12.318	13.057	13.841	14.671	15.552
Niger	OR	Franc	302.95	289.40	256.45	259.00	275.33	562.21	652.95	704.95	744.31	625.50	519.36
Nigeria	PR	Naira	5.353	7.651	9.001	9.862	19.646	21.89	97.95	109.55	112.95	126.40	136.50
Norway	OR	Krone	6.570	6.615	5.907	5.973	6.925	7.600	8.040	8.849	9.012	6.966	6.680
Oman	OR	Omani	0.3845	0.3845	0.3845	0.3845	0.3845	0.3845	0.3845	0.3845	0.3845	0.3845	0.3845
Pakistan	MR	Rupee	18.65	21.42	21.90	24.72	25.70	45.89	51.78	58.03	60.86	58.53	57.22
Panama	OR	Balboa	1	1	1	1	1	1	1	1	1	1	1
Papua New Guinea	OR	Kina	0.826	0.860	0.953	0.953	0.987	2.096	2.695	3.072	3.762	4.019	3.333

Appendix 4. Historical exchange rates (Source: IMF)

Country		Currency	1988	1989	1990	1991	1992	1998	1999	2000	2001	2002	2003
Paraguay	MR	Guarani	550.00	1218.00	1258.00	1380.00	1630.00	2840.19	3328.86	3526.90	4682.00	7103.59	6114.96
Peru	MR	New sol:	0.0005	0.0053	0.517	0.960	1.630	3.160	3.510	3.527	3.444	3.514	3.463
Peru	MR	New sol:	500.11	5261.16	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a	n.a.
Peru	MR	New sol:	0.50	5.26	516.92	960.00	1630.00	3160.00	3510.00	3527.00	3444.00	3514.00	3463.00
Philippines	MR	Peso	21.33	22.44	28.00	26.65	25.10	39.06	40.31	50.00	51.40	53.10	55.57
Poland	OR	Zloty	0.05	0.65	0.95	1.10	1.58	3.50	4.15	4.14	3.99	3.84	3.74
Qatar	OR	Riyal	3.64	3.64	3.64	3.64	3.64	3.64	3.64	3.64	3.64	3.64	3.64
Romania	PR	Leu	14.37	14.44	34.71	189.00	460.00	10950.97	18255.02	25925.97	31597.00	33499.99	32595.01
Russia	OR	Ruble	n.a.	n.a.	n.a.	n.a.	0.42	20.65	27.00	28.16	30.14	31.78	29.45
Rwanda	OR	Franc	76.32	78.16	120.32	119.67	146.47	320.13	349.17	430.32	455.82	511.85	571.39
Samoa	OR	Tala	2.15	2.29	2.33	2.45	2.56	3.01	3.02	3.34	3.55	3.22	2.78
São Tomé & Príncipe	OR	Dobra	98.18	140.37	140.98	280.02	375.54	6885.00	7299.98	8610.65	9019.68	9191.85	9455.91
Saudi Arabia	OR	Riyal	3.75	3.75	3.74	3.74	3.74	3.74	3.75	3.75	3.74	3.74	3.75
Senegal	OR	Franc	302.95	289.40	256.45	259.00	275.33	562.21	652.95	704.95	744.31	625.50	519.36
Seychelles	OR	Rupee	5.376	5.505	5.085	5.058	5.261	5.447	5.368	6.266	5.747	5.037	5.480
Sierra Leone	MR	Leone	39.06	65.36	188.68	434.78	526.32	1590.76	2276.05	1666.67	2161.27	2191.73	2562.18
Singapore	MR	Dollar	1.946	1.894	1.744	1.631	1.645	1.660	1.666	1.732	1.851	1.737	1.701
Slovak Republic	OR	Koruna	n.a.	n.a.	n.a.	n.a.	n.a.	36.91	42.27	47.39	48.47	40.04	32.98
Slovenia	OR	Tolar	n.a.	n.a.	n.a.	56.69	98.70	161.20	196.77	227.38	250.95	221.07	187.80
Solomon Islands	OR	Dollar	2.118	2.397	2.614	2.795	3.100	4.859	5.076	5.099	5.565	7.457	n.a.
South Africa	PR	Rand	2.378	2.536	2.563	2.743	3.053	5.860	6.154	7.568	12.126	8.640	6.640
Sri Lanka	MR	Rupee	33.03	40.00	40.24	42.58	46.00	68.30	72.17	82.58	93.16	96.73	96.74
St. Kitts and Nevis	OR	Dollar	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
St. Lucia	OR	Dollar	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
St. Vincent & Grens.	OR	Dollar	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Sudan	PR	Pound	0.450	0.450	0.450	1.499	13.514	237.80	257.70	257.35	261.43	261.68	260.16
Suriname	MR	Guilder	1.785	1.785	1.785	1.785	1.785	401.00	987.50	2178.50	2178.50	2515.00	n.a.
Swaziland	OR	Lilangeni	2.378	2.536	2.563	2.743	3.053	5.860	6.154	7.568	12.126	8.640	6.640
Sweden	OR	Krona	6.157	6.227	5.698	5.529	7.043	8.061	8.525	9.535	10.668	8.825	7.275
Switzerland	OR	Franc	1.504	1.547	1.296	1.356	1.456	1.376	1.600	1.636	1.677	1.387	1.237
Syrian Arab Republic	PR	Pound	11.23	11.22	11.23	11.23	11.23	11.22	11.22	11.23	11.23	11.22	11.22
Tajikistan	OR	Somoni	n.a.	n.a.	n.a.	n.a.	n.a.	0.98	1.44	2.20	2.55	3.00	2.96
Tanzania	OR	Shilling	125.00	192.30	196.60	233.90	335.00	681.00	797.33	803.26	916.30	976.30	n.a.
Thailand	OR	Baht	25.24	25.69	25.29	25.28	25.52	36.69	37.47	43.27	44.22	43.15	39.59
Togo	OR	Franc	302.95	289.40	256.45	259.00	275.33	562.21	652.95	704.95	744.31	625.50	519.36
Tonga	OR	Pa'anga	1.170	1.258	1.296	1.332	1.390	1.616	1.608	1.977	2.207	2.229	n.a.
Trinidad and Tobago	OR	Dollar	4.250	4.250	4.250	4.250	4.250	6.597	6.300	6.300	6.290	6.300	6.273
Tunisia	MR	Dinar	0.898	0.905	0.837	0.865	0.951	1.101	1.253	1.385	1.468	1.334	1.208
Turkey	MR	Lira	1814.84	2313.69	2930.07	5079.92	8564.44	314464.18	541400.06	673384.96	1450128.51	1643697.78	1396636.54
Uganda	PR	Shilling	165.00	370.00	540.00	915.00	1217.15	1362.69	1506.04	1766.68	1727.40	1852.57	1935.32

Appendix 4. Historical exchange rates (Source: IMF)

Country		Currency	1988	1989	1990	1991	1992	1998	1999	2000	2001	2002	2003
Ukraine	OR	Hryvnia	n.a.	n.a.	n.a.	n.a.	0.01	3.43	5.22	5.43	5.30	5.33	5.33
United Arab Emirates	OR	Dirham	3.671	3.671	3.671	3.671	3.671	3.672	3.672	3.673	3.672	3.673	3.672
United Kingdom	MR	Sterling	0.5526	0.6229	0.5187	0.5346	0.6614	0.6011	0.6187	0.6702	0.6895	0.6204	0.5603
Uruguay	MR	Peso	0.4500	0.8040	1.5930	2.4880	3.4800	10.817	11.615	12.515	14.768	27.200	29.300
Vanuatu	OR	Vatu	105.05	110.70	109.25	110.79	119.00	129.78	128.89	142.81	146.74	133.17	111.81
Venezuela	OR	Bolivar	14.50	43.08	50.38	61.55	79.45	564.50	648.25	699.75	763.00	1401.25	1596.00
Vietnam	MR	Dong	1125.00	5375.00	8124.99	11499.97	10565.02	13889.97	14028.02	14513.97	15083.99	15403.01	n.a.
Yemen	OR	Rial	n.a.	n.a.	12.01	12.01	12.01	141.65	159.10	165.59	173.27	179.01	n.a.
Zambia	OR	Kwacha	10.00	21.65	42.75	88.97	359.71	2298.92	2632.19	4157.83	3830.40	4334.40	4770.71
Zimbabwe	OR	Dollar	1.943	2.270	2.636	5.051	5.482	37.37	38.14	55.07	55.04	55.04	n.a.

*The IMF distinguishes between the following three categories of exchange reates:

Market Rates (MR), Largely determined by market forces;

Official Rates (OR), determined by government authorities; and

Principal Rates (PR), for countries maintaining multiple exchange rates arrangements.

The preference is always market rates, only when these are not available other rates are used.

Appendix 5 – Table 5.1. General weight and volume conversion factors

Units	Metric Equivalents
1 Inch	=25.4 millimetres
1 Square foot	=0.0929 square metre
1 Cubic foot	=0.02832 square metre
1 Short ton	=0.9072 metric ton
1 Long ton	=1.016 metric ton

Table Approximate Equivalents for Forest Measures

Product and Unit	Cubic Meters (u.b.)	Cubic Feet (u.b.)
Sawlogs & veneer logs	*Solid volume without bark*	
1000 board/super feet	4.53	160
Pulpwood round and split		
1 stere	0.72	25.4
1 cord	2.55	90
Woodfuel		
1 stere	0.65	23
1 cord	2.12	74.9
1000 stacked cubic feet	18.41	650

Table Weight and Volume

	Kg/CUM			CUM/MT		
Product	**G**	**C**	**NC**	**G**	**C**	**NC**
Woodfuel, incl. wood for charcoal	725	625	750	1.38	1.60	1.33
Wood charcoal	167					
Sawlogs and Veneer logs						
Tropical			730			1.37
Other		700	800		1.43	1.25
Pulpwood, round and split	675	650	750	1.48	1.54	1.33
Other industrial roundwood	750	700	800	1.33	1.43	1.25
Sawnwood		550	700		1.82	1.43
Veneer sheets	750			1.33		
Plywood	650			1.54		
Particle board	650			1.54		
Hard board	950			1.053		
Medium density fibreboard (MDF)				2		
Insulating board	250			4		

Note: G = General; C = Coniferous; NC = Non-coniferous

Source: FAO forestry statistics Series 171 (pub. 2001).

APPENDIX 5 - TABLE 5.2
BASIC WOOD DENSITIES OF STEMWOOD (tonnes dry matter/m^3 fresh volume)
FOR BOREAL AND TEMPERATE SPECIES

SOURCE: IPCC GOOD PRACTICE GUIDANCE FOR LULUCF – TABLE 3A.1.9-1

Species or genus	Basic wood density m_0/V_{wet}	Source
Abies	0.40	1
Acer	0.52	1
Alnus	0.45	1
Betula	0.51	1
Carpinus betulus	0.63	3
Castanea sativa	0.48	3
Fagus sylvatica	0.58	1
Fraxinus	0.57	1
Juglans	0.53	3
Larix decidua	0.46	1
Larix kaempferi	0.49	3
Picea abies	0.40	1
Picea sitchensis	0.40	2
Pinus pinaster	0.44	5
Pinus strobus	0.32	1
Pinus sylvestris	0.42	1
Populus	0.35	1
Prunus	0.49	1
Pseudotsuga menziesii	0.45	1
Quercus	0.58	1
Salix	0.45	1
Thuja plicata	0.31	4
Tilia	0.43	1
Tsuga	0.42	4

Source:

1. Dietz, P. 1975: Dichte und Rindengehalt von Industrieholz. Holz Roh- Werkstoff 33: 135-141
2. Knigge, W.; Schulz, H. 1966: Grundriss der Forstbenutzung. Verlag Paul Parey, Hamburg, Berlin
3. EN 350-2 (1994): Durability of wood and wood products - Natural durability of solid wood - Part 2: Guide to the natural durability and treatability of selected wood species of importance in Europe
4. Forest Products Laboratory: Handbook of wood and wood-based materials. Hemisphere Publishing Corporation, New York, London
5. Rijsdijk, J.F.; Laming, P.B. 1994: Physical and related properties of 145 timbers. Kluwer Academic Publishers, Dordrecht, Boston, London
6. Kollmann, F.F.P.; Côté, W.A. 1968: Principles of wood science and technology. Springer Verlag, Berlin, New York

Appendix 5 - Table 5-3

Basic wood densities (D) of stemwood (tonnes dry matter/m3 fresh volume) for tropical tree species

Source: IPCC Good Practice Guidance for LULUCF – Table 3A.1.9-2

TROPICAL ASIA	D	TROPICAL AMERICA	D	TROPICAL AFRICA	D
Acacia leucophloea	0.76	Albizia spp.	0.52	Afzelia spp.	0.67
Adina cordifolia	0.58, 0.59+	Alcornea spp.	0.34	Aidia ochroleuca	0.78*
Aegle marmelo	0.75	Alexa grandiflora	0.6	Albizia spp.	0.52
Agathis spp.	0.44	Alnus ferruginea	0.38	Allanblackia floribunda	0.63*
Aglaia llanosiana	0.89	Anacardium excelsum	0.41	Allophyllus africanus f. acuminatus	0.45
Alangium longiflorum	0.65	Anadenanthera macrocarpa	0.86	Alstonia congensis	0.33
Albizzia amara	0.70*	Andira retusa	0.67	Amphimas pterocarpoides	0.63*
Albizzia falcataria	0.25	Aniba riparia lduckei	0.62	Anisophyllea obtusifolia	0.63*
Aleurites trisperma	0.43	Antiaris africana	0.38	Annonidium mannii	0.29*
Alnus japonica	0.43	Apeiba echinata	0.36	Anopyxis klaineana	0.74*
Alphitonia zizyphoides	0.5	Artocarpus comunis	0.7	Anthocleista keniensis	0.50*
Alphonsea arborea	0.69	Aspidosperma spp. (araracanga group)	0.75	Anthonotha macrophylla	0.78*
Alseodaphne longipes	0.49	Astronium lecointei	0.73	Anthostemma aubryanum	0.32*
Alstonia spp.	0.37	Bagassa guianensis	0.68,0.69+	Antiaris spp.	0.38
Amoora spp.	0.6	Banara guianensis	0.61	Antrocaryon klaineanum	0.50*
Anisophyllea zeylanica	0.46*	Basiloxylon exelsum	0.58	Aucoumea klaineana	0.37
Anisoptera spp,	0.54	Beilschmiedia sp.	0.61	Autranella congolensis	0.78
Anogeissus latifolia	0.78, 0.79+	Berthollettia excelsa	0.59, 0.63+	Baillonella toxisperma	0.71
Anthocephalus chinensis	0.36,0.33+	Bixa arborea	0.32	Balanites aegyptiaca	0.63*
Antidesma pleuricum	0.59	Bombacopsis sepium	0.39	Baphia kirkii	0.93*
Aphanamiris perrottetiana	0.52	Borojoa patinoi	0.52	Beilschmiedia louisii	0.70*
Araucaria bidwillii	0.43	Bowdichia spp.	0.74	Beilschmiedia nitida	0.50*
Artocarpus spp.	0.58	Brosimum spp. (alicastrum group)	0.64, 0.66+	Berlinia spp.	0.58
Azadirachta spp.	0.52	Brosimum utile	0.41, 0.46+	Blighia welwitschii	0.74*
Balanocarpus spp.	0.76	Brysenia adenophylla	0.54	Bombax spp.	0.4
Barringtonia edulis *	0.48	Buchenauia capitata	0.61, 0.63+	Brachystegia spp.	0.52
Bauhinia spp.	0.67	Bucida buceras	0.93	Bridelia micrantha	0.47*
Beilschmiedia tawa	0.58	Bulnesia arborea	1	Calpocalyx klainei	0.63*
Berrya cordifolia	0.78*	Bursera simaruba	0.29, 0.34+	Canarium schweinfurthii	0.40*
Bischofia javanica	0.54, 0.58, 0.62+	Byrsonima coriacea	0.64	Canthium rubrocostratum	0.63*
Bleasdalea vitiensis	0.43	Cabralea cangerana	0.55	Carapa procera	0.59
Bombax ceiba	0.33	Caesalpinia spp.	1.05	Casearia battiscombei	0.5
Bombycidendron vidalianum	0.53	Calophyllum sp.	0.65	Cassipourea euryoides	0.70*
Boswellia serrata	0.5	Campnosperma panamensis	0.33,0.50+	Cassipourea malosana	0.59*
Bridelia squamosa	0.5	Carapa sp.	0.47	Ceiba pentandra	0.26
Buchanania latifolia	0.45	Caryocar spp.	0.69, 0.72+	Celtis spp.	0.59
Bursera serrata	0.59	Casearia sp.	0.62	Chlorophora ercelsa	0.55
Butea monosperma	0.48	Cassia moschata	0.71	Chrysophyllum albidum	0.56*
Calophyllum spp.	0.53	Casuarina equisetifolia	0.81	Cleistanthus mildbraedii	0.87*
Calycarpa arborea	0.53	Catostemma spp.	0.55	Cleistopholis patens	0.36*
Cananga odorata	0.29	Cecropia spp.	0.36	Coelocaryon preussii	0.56”
Canarium spp.	0.44	Cedrela spp.	0.40, 0.46+	Cola sp.	0.70”
Canthium monstrosum	0.42	Cedrelinga catenaeformis	0.41, 0.53+	Combretodendron macrocarpum	0.7
Carallia calycina	0.66*	Ceiba pentandra	0.23,0.24,0.25, 0.29+	Conopharyngia holstii	0.50*
Cassia javanica	0.69	Centrolobium spp.	0.65	Copaifera religiosa .	0.50”
Castanopsis philippensis	0.51	Cespedesia macrophylla	0.63	Cordia millenii	0.34
Casuarina equisetifolia	0.83	Chaetocarpus schomburgkianus	0.8	Cordia platythyrsa	0.36”
Casuarina nodiflora	0.85	Chlorophora tinctoria	0.71,0.75+	Corynanthe pachyceras	0.63”
Cedrela odorata	0.38	Clarisia racemosa	0.53,0.57+	Coda edulis	0.78*
Cedrela spp.	0.42	Clusia rosea	0.67	Croton megalocarpus	0.57
Cedrela toona	0.43	Cochlospermum orinocensis	0.26	Cryptosepalum staudtii	0.70*
Ceiba pentandra	0.23	Copaifera spp.	0.46, 0.55+	Ctenolophon englerianus	0.78*
Celtis luzonica	0.49	Cordia spp. (gerascanthus group)	0.74	Cylicodiscus gabonensis	0.8
Chisocheton pentandrus	0.52	Cordia spp. (alliodora group)	0.48	Cynometra alexandri	0.74
Chloroxylon swietenia	0.76, 0.79, 0.80+	Couepia sp.	0.7	Dacryodes spp.	0.61
Chukrassia tabularis	0.57	Couma macrocarpa	0.50,0.53+	Daniellia ogea	0.40*
Citrus grandis	0.59	Couratari spp.	0.5	Desbordesia pierreana	0.87”
Cleidion speciflorum	0.5	Croton xanthochloros	0.48	Detarium senegalensis	0.63*
Cleistanthus eollinus	0.88	Cupressus lusitanica	0.43, 0.44+	Dialium excelsum	0.78*
Cleistocalyx spp.	0.76	Cyrilla racemiflora	0.53	Didelotia africana	0.78”
Cochlospermum gossypium+religiosum	0.27	Dactyodes colombiana	0.51	Didelotia letouzeyi	0.5

Appendix 5 - Table 5-3

Basic wood densities (D) of stemwood (tonnes dry matter/m3 fresh volume) for tropical tree species

Source: IPCC Good Practice Guidance for LULUCF – Table 3A.1.9-2

TROPICAL ASIA	D	TROPICAL AMERICA	D	TROPICAL AFRICA	D
Cocos nucifera	0.5	Dacryodes excelsa	0.52, 0.53+	Diospyros spp.	0.82
Colona serratifolia	0.33	Dalbergia retusa.	0.89	Discoglypremna caloneura	0.32*
Combretodendron quadrialatum	0.57	Dalbergia stevensonii	0.82	Distemonanthus benthamianus	0.58
Cordia spp.	0.53	Declinanona calycina	0.47	Drypetes sp.	0.63*
Cotylelobium spp.	0.69	Dialium guianensis	0.87	Ehretia acuminata	0.51*
Crataeva religiosa	0.53*	Dialyanthera spp.	0.36, 0.48+	Enantia chlorantha	0.42”
Cratoxylon arborescens	0.4	Dicorynia paraensis	0.6	Endodesmia calophylloides	0.66”
Cryptocarya spp.	0.59	Didymopanax sp.	0.74	Entandrophragma utile	0.53
Cubilia cubili	0.49	Dimorphandra mora	0.99*	Eribroma oblongum	0.60*
Cullenia excelsa	0.53	Diplotropis purpurea	0.76, 0.77, 0.78+	Eriocoelum microspermum	0.50”
Cynometra spp.	0.8	Dipterix odorata	0.81,0.86,0.89+	Erismadelphus ensul	0.56*
Dacrycarpus imbricatus	0.45, 0.47+	Drypetes variabilis	0.69	Erythrina vogelii	0.25”
Dacrydium spp.	0.46	Dussia lehmannii	0.59	Erythrophleum ivorense	0.72
Dacryodes spp.	0.61	Ecclinusa guianensis	0.63	Erythroxylum mannii	0.5
Dalbergia paniculata	0.64	Endlicheria cocvirey	0.39	Fagara macrophylla	0.69
Decussocarpus vitiensis	0.37	Enterolobium schomburgkii	0.82	Ficus iteophylla	0.40”
Degeneria vitiensis	0.35	Eperua spp.	0.78	Fumtumia latifolia	0.45*
Dehaasia triandra	0.64	Eriotheca sp.	0.4	Gambeya spp.	0.56*
Dialium spp.	0.8	Erisma uncinatum	0.42, 0.48+	Garcinia punctata	0.78”
Dillenia spp.	0.59	Erythrina sp.	0.23	Gilletiodendron mildbraedii	0.87”
Diospyros spp.	0.7	Eschweilera spp.	0.71,0.79,0.95+	Gossweilerodendron balsamiferum	0.4
Diplodiscus paniculatus	0.63	Eucalyptus robusta	0.51	Guarea thompsonii	0.55”
Dipterocarpus caudatus	0.61	Eugenia stahlii	0.73	Guibourtia spp.	0.72
Dipterocarpus eurynchus	0.56	Euxylophora paraensis	0.68,0.70+	Hannoa klaineana	0.28”
Dipterocarpus gracilis	0.61	Fagara spp.	0.69	Harungana madagascariensis	0.45”
Dipterocarpus grandiflorus	0.62	Ficus sp.	0.32	Hexalobus crispiflorus	0.48”
Dipterocarpus kerrii	0.56	Genipa spp.	0.75	Holoptelea grandis	0.59”
Dipterocarpus kunstlerii	0.57	Goupia glabra	0.67, 0.72+	Homalium spp.	0.7
Dipterocarpus spp.	0.61	Guarea chalde	0.52	Hylodendron gabonense.	0.78”
Dipterocarpus warburgii	0.52	Guarea spp.	0.52	Hymenostegia pellegrini	0.78”
Dracontomelon spp.	0.5	Guatteria spp.	0.36	Irvingia grandifolia	0.78”
Dryobalanops spp.	0.61	Guazuma ulmifolia	0.52, 0.50+	Julbernardia globiflora	0.78
Dtypetes bordenii	0.75	Guettarda scabra	0.65	Khaya ivorensis	0.44
Durio spp.	0.53	Guillielma gasipae	0.95, 1.25+	Klainedoxa gabonensis	0.87
Dyera costulata	0.36	Gwtavia sp.	0.56	Lannea welwitschii	0.45”’
Dysoxylum quercifolium	0.49	Helicostylis tomentosa	0.68, 0.72+	Lecomtedoxa klainenna	0.78”
Elaeocarpus serratus	0.40*	Hernandia Sonora	0.29	Letestua durissima	0.87”
Emblica officinalis	0.8	Hevea brasiliense	0.49	Lophira alata	0.87”
Endiandra laxiflora	0.54	Himatanthus articulata	0.40,0.54+	Lovoa trichilioides	0.45”
Endospermum spp.	0.38	Hirtella davisii	0.74	Macaranga kilimandscharica	0.40*
Enterolobium cyclocarpum	0.35	Humiria balsamifera	0.66,0.67+	Maesopsis eminii	0.41
Epicharis cumingiana	0.73	Humiriastrum procera	0.7	Malacantha sp. aff. alnifolia	0.45”
Erythrina subumbrans	0.24	Hura crepitans	0.36, 0.37, 0.38+	Mammea africana	0.62
Erythrophloeum densiflorum	0.65	Hyeronima alchorneoides	0.60,0.64+	Manilkara lacera	0.78”
Eucalyptus citriodora	0.64	Hyeronima laxiflora	0.59	Markhamia platycalyx	0.45*
Eucalyptus deglupta	0.34	Hymenaea davisii	0.67	Memecylon capitellatum	0.77”
Eugenia spp.	0.65	Hymenolobium sp.	0.64	Microberlinia brazzavillensis	0.7
Fagraea spp.	0.73	Inga sp.	0.49,0.52,0.58, 0.64+	Microcos coriaceus	0.42”
Ficus benjamina	0.65	Iryanthera spp.	0.46	Milletia spp.	0.72
Ficus spp.	0.39	Jacaranda sp.	0.55	Mitragyna stipulosa	0.47
Ganua obovatifolia	0.59	Joannesia heveoides	0.39	Monopetalanthus pellegrinii	0.47”
Garcinia myrtifolia	0.65	Lachmellea speciosa	0.73	Musanga cecropioides	0.23
Garcinia spp.	0.75	Laetia procera	0.68	Nauclea diderrichii	0.63
Gardenia turgida	0.64	Lecythis spp.	0.77	Neopoutonia macrocalyx	0.32”
Garuga pinnata	0.51	Licania spp.	0.78	Nesogordonia papaverifera	0.65
Gluta spp.	0.63	Licaria spp.	0.82	Ochtocosmus africanus	0.78’
Gmelina arborea	0.41,0.45+	Lindackeria sp.	0.41	Odyendea spp.	0.32
Gmelina vitiensis	0.54	Linociera domingensis	0.81	Oldfieldia africana	0.78*
Gonocaryum calleryanum	0.64	Lonchocarpus spp.	0.69	Ongokea gore	0.72
Gonystylus punctatus	0.57	Loxopterygium sagotii	0.56	Oxystigma oxyphyllum	0.53
Grewia tiliaefolia	0.68	Lucuma spp.	0.79	Pachyelasma tessmannii	0.70”
Hardwickia binata	0.73	Luehea spp.	0.5	Pachypodanthium staudtii	0.58”
Harpullia arborea	0.62	Lueheopsis duckeana	0.64	Paraberlinia bifoliolata	0.56”
Heritiera spp.	0.56	Mabea piriri	0.59	Parinari glabra	0.87”

Appendix 5 - Table 5-3

Basic wood densities (D) of stemwood (tonnes dry matter/m3 fresh volume) for tropical tree species

Source: IPCC Good Practice Guidance for LULUCF – Table 3A.1.9-2

TROPICAL ASIA	D	TROPICAL AMERICA	D	TROPICAL AFRICA	D
Hevea brasiliensis	0.53	Machaerium spp.	0.7	Parkia bicolor	0.36”
Hibiscus tiliaceus	0.57	Macoubea guianensis	0.40*	Pausinystalia brachythyrsa	0.56”
Homalanthus populneus	0.38	Magnolia spp.	0.52	Pausinystalia cf. talbotii	0.56”
Homalium spp.	0.76	Maguira sclerophylla	0.57	Pentaclethra macrophylla	0.78”
Hopea acuminata	0.62	Mammea americana	0.62	Pentadesma butyracea	0.78”
Hopea spp.	0.64	Mangifera indica	0.55	Phyllanthus discoideus	0.76”
Intsia palembanica	0.68	Manilkara sp.	0.89	Pierreodendron africanum	0.70;”
Kayea garciae	0.53	Marila sp.	0.63	Piptadeniastrum africanum	0.56
Kingiodendron alternifolium	0.48	Marmaroxylon racemosum	0.78*	Plagiostyles africana	0.70”
Kleinhovia hospita	0.36	Matayba domingensis	0.7	Poga oleosa	0.36
Knema spp.	0.53	Matisia hirta	0.61	Polyalthia suaveolens	0.66”
Koompassia excelsa	0.63	Maytenus spp.	0.71	Premna angolensis	0.63”
Koordersiodendron pinnatum	0.65, 0.69+	Mezilaurus lindaviana	0.68	Pteleopsis hylodendron	0.63*
Kydia calycina	0.72	Michropholis spp.	0.61	Pterocarpus soyauxii	0.61
Lagerstroemia spp.	0.55	Minquartia guianensis	0.76,0.79+	Pterygota spp.	0.52
Lannea grandis	0.5	Mora sp.	0.71	Pycnanthus angolensis	0.4
Leucaena leucocephala	0.64	Mouriria sideroxylon	0.88	Randia cladantha	0.78*
Litchi chinensis ssp. philippinensis	0.88	Myrciaria floribunda	0.73	Rauwolfia macrophylla	0.47*
Lithocarpus soleriana	0.63	Myristica spp.	0.46	Ricinodendron heudelotii	0.2
Litsea spp.	0.4	Myroxylon balsamum	0.74, 0.76, 0.78+	Saccoglottis gabonensis	0.74”
Lophopetalum spp.	0.46	Nectandra spp.	0.52	Santiria trimera	0.53*
Macaranga denticulata	0.53	Ocotea spp.	0.51	Sapium ellipticum	0.50*
Madhuca oblongifolia	0.53	Onychopetalum amazonicum	0.64	Schrebera arborea	0.63*
Mallotus philippensis	0.64	Ormosia spp.	0.59	Sclorodophloeus zenkeri	0.68*
Mangifera spp.	0.52	Ouratea sp.	0.66	Scottellia coriacea	0.56
Maniltoa minor	0.76	Pachira acuatica	0.43	Scyphocephalium ochocoa	0.48
Mastixia philippinensis	0.47	Paratecoma peroba	0.6	Scytopetalum tieghemii	0.56”
Melanorrhea spp.	0.63	Parinari spp.	0.68	Sindoropsis letestui	0.56*
Melia dubia	0.4	Parkia spp.	0.39	Staudtia stipitata	0.75
Melicope triphylla	0.37	Peltogyne spp.	0.79	Stemonocoleus micranthus	0.56”
Meliosma macrophylla	0.27	Pentaclethra macroloba	0.65,0.68+	Sterculia rhinopetala	0.64
Melochia umbellata	0.25	Peru glabrata	0.65	Strephonema pseudocola	0.56*
Me&a ferrea	0.83,0.85+	Peru schomburgkiana	0.59	Strombosiopsis tetrandra	0.63”
Metrosideros collina	0.70,0.76+	Persea spp.	0.40, 0.47,0.52+	Swartzia fistuloides	0.82
Michelia spp.	0.43	Petitia domingensis	0.66	Symphonia globulifera	0.58”
Microcos stylocarpa	0.4	Pinus caribaea	0.51	Syzygium cordatum	0.59*
Micromelum compressum	0.64	Pinus oocarpa	0.55	Terminalia superba	0.45
Milliusa velutina	0.63	Pinus patula	0.45	Tessmania africana	0.85”
Mimusops elengi	0.72*	Piptadenia sp.	0.58	Testulea gabonensis	0.6
Mitragyna parviflora	0.56	Piranhea longepedunculata	0.9	Tetraberlinia tubmaniana	0.60”
Myristica spp.	0.53	Piratinera guianensis	0.96	Tetrapleura tetraptera	0.50”
Neesia spp.	0.53	Pithecellobium guachapele (syn. Pseudosamea)	0.56	Tieghemella heckelii	0.55”
Neonauclea bernardoi	0.62	Platonia insignis	0.70’	Trema sp.	0.40*
Neotrewia cumingii	0.55	Platymiscium spp.	0.71, 0.84+	Trichilia prieureana	0.63”
Ochna foxworthyi	0.86	Podocarpus spp.	0.46	Trichoscypha arborea	0.59”
Ochroma pyramidale	0.3	Pourouma aff. melinonii	0.32	Triplochiton scleroxylon.	0.32
Octomeles sumatrana	0.27, 0.32+	Pouteria spp.	0.64, 0.67+	Uapaca spp.	0.6
Oroxylon indicum	0.32	Prioria copaifera	0.40,0.41+	Vepris undulata	0.70”
Ougenia dalbergiodes	0.7	Protium spp.	0.53,0.64+	Vitex doniana	0.4
Palaquium spp.	0.55	Pseudolmedia laevigata	0.64	Xylopia staudtii	0.36*
Pangium edule	0.5	Pterocarpus spp.	0.44		
Parashorea malaanonan	0.51	Pterogyne nitens	0.66		
Parashorea stellata	0.59	Qualea albiflora	0.5		
Paratrophis glabra	0.77	Qualea cf. lancifolia	0.58		
Parinari spp.	0.68	Qualea dinizii	0.58		
Parkia roxburghii	0.34	Qualea spp.	0.55		
Payena spp.	0.55	Quararibaea guianensis	0.54		
Peltophorum pterocarpum	0.62	Quercus alata	0.71		
Pentace spp.	0.56	Quercus costaricensis	0.61		
Phaeanthus ebracteolatus	0.56	Quercus eugeniaefolia	0.67		
Phyllocladus hypophyllus	0.53	Quercus spp.	0.7		
Pinus caribaea	0.48	Raputia sp.	0.55		
Pinus insularis	0.47,0.48+	Rheedia spp.	0.72		

Appendix 5 - Table 5-3

Basic wood densities (D) of stemwood (tonnes dry matter/m3 fresh volume) for tropical tree species

Source: IPCC Good Practice Guidance for LULUCF – Table 3A.1.9-2

TROPICAL ASIA	D	TROPICAL AMERICA	D	TROPICAL AFRICA	D
Pinus merkusii	0.54	Rollinia spp.	0.36		
Pisonia umbellifera	0.21	Saccoglottis cydonioides	0.72		
Pittosporum pentandrum	0.51	Sapium ssp.	0.47,0.72+		
Planchonia spp.	0.59	Schinopsis spp.	1		
Podocarpus spp.	0.43	Sclerobium spp.	0.47		
Polyalthia flava	0.51	Sickingia spp.	0.52		
Polyscias nodosa	0.38	Simaba multiflora	0.51		
Pometia spp.	0.54	Simarouba amara	0.32, 0.34,0.38+		
Pouteria villamilii	0.47	Sloanea guianensis	0.79		
Premna tomentosa	0.96	Spondias mombin	0.30, 0.40, 0.41+		
Pterocarpus marsupium	0.67	Sterculia spp.	0.55		
Pterocymbium tinctorium	0.28	Stylogyne spp.	0.69		
Pyge'um vulgare	0.57	Swartzia spp.	0.95		
Quercus spp.	0.7	Swietenia macrophylla	0.42, 0.45, 0.46, 0.54+		
Radermachera pinnata	0.51	Symphonia globulifera	0.68		
Salmalia malabarica	0.32,0.33+	Tabebuia spp. (lapacho group)	0.91		
Samanea saman	0.45, 0.46+	Tabebuia spp. (roble)	0.52		
Sandoricum vidalii	0.43	Tabebuia spp. (white cedar)	0.57		
Sapindus saponaria	0.58	Tabebuia stenocalyx	0.55,0.57+		
Sapium luzontcum	0.4	Tachigalia myrmecophylla	0.56		
Schleichera oleosa	0.96	Talisia sp.	0.84		
Schrebera swietenoides	0.82	Tapirira guianensis	0.47*		
Semicarpus anacardium	0.64	Terminalia sp.	0.50, 0.51, 0.58+		
Serialbizia acle	0.57	Tetragastris altisima	0.61		
Serianthes melanesica	0.48	Toluifera balsamum	0.74		
Sesbania grandiflora	0.4	Torrubia sp.	0.52		
Shorea assamica forma philippinensis	0.41	Toulicia pulvinata	0.63		
Shorea astylosa	0.73	Tovomita guianensis	0.6		
Shorea ciliata	0.75	Trattinickia sp.	0.38		
Shorea contorta	0.44	Trichilia propingua	0.58		
Shorea gisok	0.76	Trichosperma mexicanum	0.41		
Shorea guiso	0.68	Triplaris spp.	0.56		
Shorea hopeifolia	0.44	Trophis sp.	0.54		
Shorea malibato	0.78	Vatairea spp.	0.6		
Shorea negrosensis	0.44	Virola spp.	0.40, 0.44, 0.48+		
Shorea palosapis	0.39	Vismia spp.	0.41		
Shorea plagata	0.7	Vitex spp.	0.52,0.56, 0.57+		
Shorea polita	0.47	Vitex stahelii	0.6		
Shorea polysperma	0.47	Vochysia spp.	0.40,0.47, 0.79+		
Shorea robusta	0.72	Vouacapoua americana	0.79		
Shorea spp. balau group	0.7	Warszewicsia coccinea	0.56		
Shorea spp. dark red meranti	0.55	Xanthoxylum martinicensis	0.46		
Shorea spp. light red meranti	0.4	Xanthoxylum spp.	0.44		
Shorea spp. white meranti	0.48	Xylopia frutescens	0 64”		
Shorea spp. yellow meranti	0.46				
Shorea virescens	0.42				
Sloanea javanica	0.53				
Soymida febrifuga	0.97				
Spathodea campanulata	0.25				
Stemonurus luzoniensis	0.37				
Sterculia vitiensis	0.31				
Stereospermum suaveolens	0.62				
Strombosia philippinensis	0.71				
Strychnos potatorum	0.88				
Swietenia macrophylla	0.49,0.53+				
Swintonia foxworthyi	0.62				
Swintonia spp.	0.61				
Sycopsis dunni	0.63				
Syzygium spp.	0.69, 0.76+				
Tamarindus indica	0.75				
Tectona grandis	0.50,0.55+				
Teijsmanniodendron ahernianum	0.9				
Terminalia citrina	0.71				

Appendix 5 - Table 5-3

Basic wood densities (D) of stemwood (tonnes dry matter/m3 fresh volume) for tropical tree species

Source: IPCC Good Practice Guidance for LULUCF – Table 3A.1.9-2

TROPICAL ASIA	D	TROPICAL AMERICA	D	TROPICAL AFRICA	D
Terminalia copelandii	0.46				
Terminalia foetidissima	0.55				
Terminalia microcarpa	0.53				
Terminalia nitens	0.58				
Terminalia pterocarpa	0.48				
Terminalia tomentosa	0.73,0.76, 0.77+				
Ternstroemia megacarpa	0.53				
Tetrameles nudiflora	0.3				
Tetramerista glabra	0.61				
Thespesia populnea	0.52				
Toona calantas	0.29				
Trema orientalis	0.31				
Trichospermum richii	0.32				
Tristania spp.	0 . 8 0				
Turpinia ovalifolia	0.36				
Vateria indica	0.47*				
Vatica spp.	0.69				
Vitex spp.	0.65				
Wallaceodendron celebicum	0.55, 0.57+				
Weinmannia luzoniensis	0.49				
Wrightia tinctorea	0.75				
Xanthophyllum excelsum	0.63				
Xanthostemon verdugonianus	1.04				
Xylia xylocarpa	0.73,0.81+				
Zanthoxylum rhetsa	0.33				
Zizyphus spp.	0.76				

+ The wood densities specified pertain to more than one bibliographic source.

* Wood density value is derived from the regression equation.

APPENDIX 5 - TABLE 5.4
DEFAULT VALUES OF BIOMASS EXPANSION FACTORS (BEFS)
(BE to be used in connection with growing stock biomass data)

SOURCE: IPCC GOOD PRACTICE GUIDANCE FOR LULUCF – TABLE 3A.1.10

Climatic zone	Forest type	Minimum dbh (cm)	BEF (overbark) to be used in connection to growing stock biomass data
Boreal	Conifers	0-8.0	1.35 (1.15-3.8)
	Broadleaf	0-8.0	1.3 (1.15-4.2)
Temperate	Conifers: Spruce-fir	0-12.5	1.3 (1.15-4.2)
	Pines	0-12.5	1.3 (1.15-3.4)
	Broadleaf	0-12.5	1.4 (1.15-3.2)
Tropical	Pines	10.0	1.3 (1.2-4.0)
	Broadleaf	10.0	3.4 (2.0-9.0)

Note: BEs given here represent averages for average growing stock or age, the upper limit of the range represents young forests or forests with low growing stock; lower limits of the range approximate mature forests or those with high growing stock. The values apply to growing stock biomass (dry weight) including bark and for given minimum diameter at breast height; Minimum top diameters and treatment of branches is unspecified. Result is above-ground tree biomass.

Sources: Isaev *et al.*, 1993; Brown, 1997; Brown and Schroeder, 1999; Schoene, 1999; FAO TBFRA, 2000; Lowe *et al.*, 2000; please also refer to FRA Working Paper 68 and 69 for average values for developing countries (http://www.fao.org/forestry/index.jsp)

APPENDIX 5 - TABLE 5.5
AVERAGE BELOWGROUND TO ABOVEGROUND BIOMASS RATIO (ROOT-SHOOT RATIO, R) IN NATURAL REGENERATION BY BROAD CATEGORY (tonnes dry matter/tonne dry matter)

SOURCE: IPCC GOOD PRACTICE GUIDANCE FOR LULUCF – TABLE 3A.1.8

	Vegetation type	Aboveground biomass (t/ha)	Mean	SD	lower range	upper range
Tropical/sub-tropical forest	Secondary tropical/sub-tropical forest	<125	**0.42**	0.22	0.14	0.83
	Primary tropical/sub-tropical moist forest	NS	**0.24**	0.03	0.22	0.33
	Tropical/sub-tropical dry forest	NS	**0.27**	0.01	0.27	0.28
Conifer forest/ plantation	Conifer forest/plantation	<50	**0.46**	0.21	0.21	1.06
	Conifer forest/plantation	50-150	**0.32**	0.08	0.24	0.50
	Conifer forest/plantation	>150	**0.23**	0.09	0.12	0.49
Temperate broadleaf forest/ plantation	Oak forest	>70	**0.35**	0.25	0.20	1.16
	Eucalypt plantation	<50	**0.45**	0.15	0.29	0.81
	Eucalypt plantation	50-150	**0.35**	0.23	0.15	0.81
	Eucalypt forest/plantation	>150	**0.20**	0.08	0.10	0.33
	Other broadleaf forest	<75	**0.43**	0.24	0.12	0.93
	Other broadleaf forest	75-150	**0.26**	0.10	0.13	0.52
	Other broadleaf forest	>150	**0.24**	0.05	0.17	0.30
Grassland	Steppe/tundra/prairie grassland	NS	**3.95**	2.97	1.92	10.51
	Temperate/sub-tropical/tropical grassland	NS	**1.58**	1.02	0.59	3.11
	Semi-arid grassland	NS	**2.80**	1.33	1.43	4.92
Other	Woodland/savanna	NS	**0.48**	0.19	0.26	1.01
	Shrubland	NS	**2.83**	2.04	0.34	6.49
	Tidal marsh	NS	**1.04**	0.21	0.74	1.23

NS = Not specified

APPENDIX 5 - TABLE 5.6
UPDATED DEFAULTS OF DEAD WOOD STOCKS, AND DEAD-LIVE RATIOS
(Note that these are mostly based on semi natural and near natural forests)

SOURCE: IPCC GOOD PRACTICE GUIDANCE FOR LULUCF – TABLE 3.2.2

Biome[a]	**Average (median) dead wood stock (tonnes d.m. ha^{-1})**	**Coefficient of Variation/Number of stands**
Tropical forest	18.2	2.12/37
Evergreen forest	43.4	1.12/64
Deciduous forest	34.7	1.00/62
	Average (median) dead-live ratio	**Coefficient of Variation/Number of stands**
Tropical forest	0.11	0.75/10
Evergreen forest	0.20	1.33/18
Deciduous forest	0.14	0.77/19

Sources: Harmon, M. E., O. N. Krankina, M. Yatskov, and E. Matthews. 2001. Predicting broad-scale carbon stores of woody detritus from plot-level data. Pp. 533-552 In: Lal, R., J. Kimble, B. A. Stewart, Assessment Methods for Soil Carbon, CRC Press, New York

APPENDIX 5 - TABLE 5.7
DEFAULT VALUES FOR LITTER CARBON STOCKS OF MATURE FORESTS (TONNES C HA^{-1})
AVERAGE VALUES AND RANGE

SOURCE: IPCC GOOD PRACTICE GUIDANCE FOR LULUCF – TABLE 3.2.1

Climate	Forest Type	
	Broadleaf Deciduous	**Needleleaf Evergreen**
Boreal, dry	25 (10-58)	31 (6-86)
Boreal, moist	39 (11-117)	55 (7-123)
Cold temperate, dry	28 (23-33)[a]	27 (17-42) [a]
Cold temperate, moist	16 (5-31) [a]	26 (10-48) [a]
Warm temperate, dry	28.2 (23.4-33.0)[a]	20.3 (17.3-21.1)[a]
Warm temperate, moist	13 (2-31) [a]	22 (6-42)[a]
Subtropical	2.8 (2-3)	4.1
Tropical	2.1 (1-3)	5.2

Source: Siltanen *et al.*, 1997; and Smith and Heath, 2002; Tremblay *et al.*, 2002; and Vogt *et al.*,1996, converted from mass to carbon by multiplying by conversion factor of 0.37 (Smith and Heath, 2002).

Note: Ages follow Smith and Heath (2002).

[a] Values in parentheses marked by superscript ‘a’ are the 5th and 95th percentiles from simulations of inventory plots, while those without superscript ‘a’ indicate the entire range.

APPENDIX 5 - TABLE 5.8
DEFAULT REFERENCE (UNDER NATIVE VEGETATION) SOIL ORGANIC C STOCKS (SOC_{REF})
(tonnes C per ha for 0-30 cm depth)

SOURCE: IPCC GOOD PRACTICE GUIDANCE FOR LULUCF – TABLE 3.2.4

Region	HAC soils[1]	LAC soils[2]	Sandy soils[3]	Spodic soils[4]	Volcanic soils[5]	Wetlands soils[6]
Boreal	68	NA	10#	117	20#	146
Cold temperate, dry	50	33	34	NA	20#	87
Cold temperate, moist	95	85	71	115	130	
Warm temperate, dry	38	24	19	NA	70#	88
Warm temperate, moist	88	63	34	NA	80	
Tropical, dry	38	35	31	NA	50#	86
Tropical, moist	65	47	39	NA	70#	
Tropical, wet	44	60	66	NA	130#	

Note: Data are derived from soil databases described by Jobbagy and Jackson (2000) and Bernoux *et al.* (2002). Mean stocks are shown. A default error estimate of 95% (expressed as 2X standard deviations as percent of the mean are assumed for soil-climate types. NA denotes 'not applicable' because these soils do not normally occur in some climate zones.

# indicates where no data were available and default values from 96 GL were retained.

[1] Soils with high activity clay (HAC) minerals are lightly to moderately weathered soils, which are dominated by 2:1 silicate clay minerals (in the World Reference Base for Soil Resources (WRB) classification these include Leptosols, Vertisols, Kastanozems, Chernozems, Phaeozems, Luvisols, Alisols, Albeluvisols, Solonetz, Calcisols, Gypsisols, Umbrisols, Cambisols, Regosols; in USDA classification includes Mollisols, Vertisols, high-base status Alfisols, Aridisols, Inceptisols).

[2] Soils with low activity clay (LAC) minerals are highly weathered soils, dominated by 1:1 clay minerals and amorphous iron and aluminium oxides (in WRB classification includes Acrisols, Lixisols, Nitisols, Ferralsols, Durisols; in USDA classification includes Ultisols, Oxisols, acidic Alfisols).

[3] Includes all soils (regardless of taxonomic classification) having > 70% sand and < 8% clay, based on standard textural analyses (in WRB classification includes Arenosols,; in USDA classification includes Psamments).

[4] Soils exhibiting strong podzolization (in WRB classification includes Podzols; in USDA classification Spodosols)

[5] Soils derived from volcanic ash with allophanic mineralogy (in WRB classification Andosols; in USDA classification Andisols)

[6] Soils with restricted drainage leading to periodic flooding and anaerobic conditions (in WRB classification Gleysols; in USDA classification Aquic suborders).