Forestry Department
Food and Agriculture Organization of the United Nations

GLOBAL FOREST RESOURCES ASSESSMENT

COUNTRY REPORTS

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The Forest Resources Assessment Programme

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

FAO, at the request of its member countries, regularly monitors the world's forests and their management and uses through the Forest Resources Assessment Programme. This country report forms part of the Global Forest Resources Assessment 2005 (FRA 2005), which is the most comprehensive assessment to date. More than 800 people have been involved, including 172 national correspondents and their colleagues, an Advisory Group, international experts, FAO staff, consultants and volunteers. Information has been collated from 229 countries and territories for three points in time: 1990, 2000 and 2005.

The reporting framework for FRA 2005 is based on the thematic elements of sustainable forest management acknowledged in intergovernmental forest-related fora and includes more than 40 variables related to the extent, condition, uses and values of forest resources. More information on the FRA 2005 process and the results - including all the country reports - is available on the FRA 2005 Web site (www.fao.org/forestry/fra2005).

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1 Table T1 Extent of Forests and Other Wooded Lands

1.1 FRA 2005 Categories and Definitions

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 with Tree Cover	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.
Other Land	All land that is not classified as "Forest" or "Other Wooded Land".
Inland Water bodies	Inland water bodies generally include major rivers and lakes.

1.2 National Data

1.2.1 Data Sources

Remote Sensing and GIS Section of Planning and Statistics Division, Forest Department, under Ministry of Forestry is the organization responsible for processing forest cover data of Myanmar. The first forest resource appraisal in the country was initiated in 1957 using 1:24,000 scale aerial photography and manual interpretation. The second appraisal (1975) was assessed by using 1:1million scale colour composite from 80m x 80mx MSS data. The third appraisal (1989) was implemented with 1:500,000 scale Landsat TM data (30m x 30m resolution) and manual interpretation. The fourth appraisal compiled for FRA2000 in 1997 was a combination of various surveys, however, majority consisted digital classification of 30m x 30m Landsat TM data. The latest appraisal has data from Landsat 7 ETM databases, some of the areas have been checked in the field thoroughly by using 1 meter resolution IKONOS images from anti-narcotic surveys.

References to sources of information	**Quality (H/M/L)**	**Variable(s)**	**Year(s)**
GOM. 1991. Forest Cover of Myanmar, the 1989 Appraisal. Kyaw Tint and Tun Hla, Yangon January 1991.	H	Extent	1975 &1989
GOM. 1997. ISDP (Information System Development Project for the Management of Tropical Forest), Rakhine, Yangon, Bago, Magwe, Chin, Mandalay, Kayah, Sagaing, Ayeyarwady State and Divisons	H	Extent	1997
GOM. 1997. Land Use and Land Cover Mapping for Mon State	H	Extent	1997
GOM. 1998. Anti-narcotic sampling frame mapping, Landuse Map of Shan States using 2001 Landsat 7 ETM data.	H	Extent	1998
GOM. 2000a. Tanintharyi Division, Study on forest resources and landuse changes in the southern part of Myanmar. FAO,FD	H	Extent	2000
GOM. 2000b. Kachin State Land Cover Mapping, Inter Departmental Project, Forest Department	H	Extent	2000
GOM. 2000c. Karen State Land Cover Mapping, Inter Departmental Project	H	Extent	2000

1.2.2 National Classification and Definitions

Four separate survey data are used as baseline data. 67% of the data is from the Information System Development Project for the Management of Tropical Forest. The data for Shan State and Kachin State are only estimation in FRA2000 as these areas are partially covered with 1997 surveys. Now a landcover map for these two states is being developed. Data for Taninthary Division is produced from 1997 (average image year) using manual interpretation of 1:250,000 scale print outs of Landsat 5 TM. The latest data is digitally interpreted data of Landsat7 ETM. Moreover, year 2000 data for Karen State is amended by RS & GIS Section. As all different surveys are controlled and driven by the user needs, so that priority classifications are different. All National Data are grouped into following classification.

Closed Forest	under forestry or no land use, spanning more than 0.5hectares; with trees higher than 5 meters and a canopy cover of more than 40 percent, or trees able to reach these thresholds *in situ*.
Open Forest (normally degraded forests)	under forestry or no land use, spanning more than 0.5hectares; with trees higher than 5 meters and a canopy cover between 10 and 40 percent, or trees able to reach these thresholds *in situ*.
Mangrove	Area covered by Mangrove tree species as interpreted from satellite imagery and aerial photographs
Agriculture	Permanent agriculture areas, mostly from plains and valleys. In some cases it is mixed with shifting cultivation
Shifting Cultivation	Shifting Cultivation in the forested areas and mountain areas
Other Wooded lands (Scrub and Grass Land)	Areas mostly covered by grassland and stunted trees, shrub forests, lower that 10% crown density.
Water	Inland water bodies, lakes, reservoirs, large streams and rivers
Others	Other areas (snow, rock, bareland, sandbanks)

1.2.3 Original National Data

FRA 2005 Classes		Extent in "000" ha		
	1975	**1989**	**1997**	**1998**
Closed Forests	30322.0	31553.8	25293.9	25516.6
Open Forests	10873.6	8131.1	10080.8	9970.5
Sub -Total Forests	**41195.6**	**39684.9**	**35374.7**	**35487.1**
Other wooded Land	8876.0	10178.0	11919.3	10547.0
Other Land (including water bodies)	17586.8	17792.9	20363.8	21623.8
Total Land area	**67658.4**	**67655.8**	**67657.9**	**67657.9**

1.3 Analysis and Processing of National Data

1.3.1 Calibration

Total country area calibration has been implemented with the latest data from Survey Department for each period. It also tallies with FAO statistics figure of 67658 (000 hectares) except in 1989, which is calibrated to match FAO figures.

National Classes		Extent in "000" ha		
	1975	**1989**	**1997**	**1998**
Closed Forests	30322	31554	25294	25517
Open Forests	10874	8131	10081	9970
Sub -Total Forests	**41196**	**39685**	**35375**	**35487**
Other wooded Land	8876	10178	11919	10547
Inland water bodies	1903	1903	1903	1903
Other land	15683	15892	18461	19721
Total Area of country	**67658**	**67658**	**67658**	**67658**

1.3.2 Estimation and Forecasting

This table uses information from two years (1989 and 1998) that are closest to the FRA reference years (1990, 2000 and 2005). The estimation method is simple linear interpolation and extrapolation. For example for 2005 the formula used is {figure of 1998 +((figure of 1998-figure of 1989)/(1998-1989))*(2005-1998)}.

	1990	**2000**	**2005**
Forests	39219	34554	32222
Other Wooded land	10219	10629	10834
Other land	16317	20572	22699
Inland Water bodies	1903	1903	1903
Total Area of Country	**67658**	**67658**	**67658**

1.4 Reclassification into FRA 2005 Classes

This step is not necessary because national and FRA 2005 categories match with each other.

1.5 Data for National reporting table T1

FRA 2005 Categories	Area (1000 hectares)		
	1990	**2000**	**2005**
Forest	39219	34554	32222
Other wooded land	10219	10629	10834
Other land	16317	20572	22699
...of which with tree cover [1)]			
Inland water bodies	1903	1903	1903
TOTAL	**67658**	**67658**	**67658**

1.6 Comments to National Reporting Table T1

There is no national information on “other land that has a tree cover”.

2 Table T2 Ownership of Forests and Other Wooded Lands

2.1 FRA 2005 Categories and Definitions

Category	Definition
Private ownership	Land owned by individuals, families, private co-operatives, corporations, industries, religious and educational institutions, pension or investment funds, and other private institutions.
Public ownership	Land owned by the State (national, state and regional governments) or government-owned institutions or corporations or other public bodies including cities, municipalities, villages and communes.
Other ownership	Land that is not classified either as "Public ownership" or as "Private ownership".

2.2 National Data

2.2.1 National Data Sources

Following data sources have been used to compile information for this table.

2.2.1 Data source

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)
GOM. 1989. Forest Department, Planning and Statistics Div.	M	Ownership	1985-1989
GOM. 2001 Statistical Year Book 2001	M	Ownership	1990-1996
GOM. 2002. Statistical Year Book 2002	M	Ownership	1997-2001
GOM. 2003. Forest Department, Planning and Statistics Div.	M	Ownership	2002-2003
GOM. 2004. Forest Department, Planning and Statistics Div.	M	Ownership	2003-2004
GOM. 2005. Forest Department, Planning and Statistics Div.	M	Ownership	2004-2005

2.2.2 National Classification and Definitions

In Myanmar Reserved Forests, Protected Public Forests, and unclassed forests are three major legal classes. A legal notification in the government gazette under Myanmar Forest Act (1992) creates or defines the boundaries of Reserved Forests and Protected Public Forests. All the three categories of forests are owned by the "State".

Terms	Definition
Reserved Forest	means land constituted as "reserved forest" under Forest Law (1992) which is property of Government.
Protected Public Forest	means land constituted as "protected public forest" under Forest Rules (1992) which is property of Government.
Unclass Forests	Any forest land or waste land or any other land "recorded" in land records as forest land but not notified in government gazette as "reserved" or "protected public forest" under Forest Law (1992) and Forest Rules (1995).

2.2.3 Original National Data

All forest area, whether notified as reserved and protected under forest act or not notified and categorised as un-classed forests belong to the "State". However, there are some forest areas (34000 ha in 2003 and 35000 ha in 2004 and 41000 ha in 2005) that are not under "state ownership". These are the area brought under community forests owned by the local people with long-term lease permission of the government.

2.3 Analysis and Processing of National Data

2.3.1 Calibration

This step is not needed.

2.3.2 Estimation and Forecasting

Estimation is considered not necessary.

2.4 Reclassification into FRA 2005 Classes

Table: Reclassification (Percentage allocation) into FRA 2005 classes

National Classes of Ownership	Percentage of a National Class belonging to a FRA Class		
	Public Ownership	Private Ownership	Other or unspecified Ownership
Reserved Forest	100	0	0
Protected Public Forest	100	0	0
Unclassed Forests	100	0	0
Community Forest	0	100	0

2.5 Data for National Reporting Table T2

FRA 2005 Categories	Area (1000 hectares)			
	Forest		Other wooded land	
	1990	2000	1990	2000
Private ownership				
Public ownership	39219	34554	10219	10629
Other ownership				
TOTAL	39219	34554	10219	10629

2.6 Comments for National Reporting Table 2

All forest area, whether notified as reserved and protected under forest act or not notified and categorised as un-classed forests belong to the "State". However, there are some forest areas (34000 ha in 2003 and 35000 ha in 2004 and 41000 ha in 2005) that are not under "state ownership". These are the area brought under community forests owned by the local people with long-term lease permission of the government.

3 Table T3 Designated function of Forest and Other wooded land

3.1 FRA 2005 Categories and definitions

Types of designation

Category	Definition
Primary function	A designated function is considered to be primary when it is significantly more important than other functions. This includes areas that are legally or voluntarily set aside for specific purposes.
Total area with function	Total area where a specific function has been designated, regardless whether it is primary or not.

Designation categories

Category / Designated function	Definition
Production	Forest / Other wooded land designated for production and extraction of forest goods, including both wood and non-wood forest products.
Protection of soil and water	Forest / Other wooded land designated for protection of soil and water.
Conservation of biodiversity	Forest / Other wooded land designated for conservation of biological diversity.
Social services	Forest / Other wooded land designated for the provision of social services.
Multiple purpose	Forest / Other wooded land designated to any combination of: production of goods, protection of soil and water, conservation of biodiversity and provision of social services and where none of these alone can be considered as being significantly more important than the others.
No or unknown function	Forest / Other wooded land for which a specific function has not been designated or where designated function is unknown.

3.2 National data

3.2.1 Data sources

References to sources of information	**Quality (H/M/L)**	**Variable(s)**	**Year(s)**
GOM. 2000. Thirty Year Plan for Forestry Sector of Myanmar. Forest Department, Planning and Statistics Div	M	Designation	
GOM. 1995. Forest Working plan (1995-2005). Forest Department, Planning and Statistics Div	M	Designation	

Forest Management Plans of Myanmar Forest Department classifies the forest area of the country into following 7 categories for management purposes (known as working circles). Some other wooded lands may be included in these working circle areas. Working circle can also overlap (NWFP with production working circle) each other. The following data is extracted from Thirty Years Plans for Forestry Sector of Myanmar where 61 FMU (Forest management Units) data has been compiled. This data is also available only for current working plan period (1995-2005). The old working plans that expired in 1970but not updated till 1995 provide similar classification for 1990.

3.2.2 National Classification and Definitions

Forest Management Plans (1995-2005) provides objective of the forest working circle in the management plan which may be treated as description of the classification based on designation of the forests for year 2000 and 2005.

Type of Working Circles	Description
Non Wood Forest Products working circle	for meeting NWFP products
Production Working Circle	for meeting timber requirements
Plantations Working Circle	for meeting timber requirements through artificial regeneration
Local Supply/Community Forestry W.C	for meeting fuelwood and other minor forest products for local community
Watershed Forests W.C	For meeting conservation of soil and water resources
Mangrove Forests	For utilising, and also conservation of coastal mangrove forests
Protected Areas System W.C	National Parks and Sanctuaries

The following table from old working plans (expired in 1970 but no updated till 1995) provides the description of the designation of the Forests for year 1990.

Type of Working Circles		Description
1	Teak Selection Working Circle	for meeting teak timber requirements, it includes hardwood supply working circle
2	Teak Eradication Working Circle	for eradication of teak in unfavourable non forest areas (rice fields etc.)
3	Hardwood supply working circle	for meeting hardwood requirements, it is part of teak selection working circle
4	Public Forest Working Circle	for meeting timber needs from public forests (not forest reserved areas)
5	Local Supply Working Circle	for meeting fuelwood and other minor forest products for local community
6	Cutch Working Circle	for special manufacturing of cutch (acacia catechu)
7	Fuelwood Working Circle	for meeting fuelwood products for local community
8	Tidal Forest Working Circle	for meeting mangrove timber, fuelwood and charcoal products
9	Special Working Circles	for meeting special needs

3.2.3 Original National Data

Following information is for forests. Similar information is not available for "Other Wooded lands" except that all this class falls into multipurpose category.

A. Data for 1990

Working Circle Area of 36 Forest Divisions (expired at 1970 but not updated till 1995)

Type of Working Circles		Area in 000 hectares
1	Teak Selection Working Circle	2854
2	Teak Eradication Working Circle	239
3	Hardwood supply working circle	1178
4	Public Forest Working Circle	290
5	Local Supply Working Circle	101
6	Cutch Working Circle	87
7	Fuelwood Working Circle	50
8	Tidal Forest Working Circle	46
9	Special Working Circles	312
Total		**5157**

(Note: Teak Selection Working Circle area contains Hardwood supply working circles)

This information has been updated for 1990 as under with information on "Protected Areas System".

Type of Working Circles	**Area in 000 hectares**
Teak Selection Working Circle	2854
Teak Eradication Working Circle	239
Hardwood supply working circle	1178
Public Forest Working Circle	290
Local Supply Working Circle	101
Cutch Working Circle	87
Fuelwood Working Circle	50
Tidal Forest Working Circle	46
Special Working Circles	312
Protected Areas Systems Area	720
Total Under management plans	5877
Forest area not under management plans	33625
Total Forest Area 1990 Table 1	39502

B. Data for 2000 and 2005

Working Circle Area of 61 Forest Management Units (1995-2005)

	Type of Working Circles	**Area in 000 hectares (2000)**
1	Non Wood Forest Products W.C	5182
2	Production Working Circle	12017
3	Plantations Working Circle	651
4	Local Supply/ Community Forestry W.C	6749
5	Watershed Forests W.C	1499
6	Mangrove W.C	76
7	Protected Areas System W.C	964
Total		**27138**

The above data updated with data of Protected Area System for 2000 and actual area under plantations in 2000.

Type of Working Circles	**Area in 000 hectares (2000)**
Non Wood Forest Products W.C	5182
Production Working Circle	12017
Plantations Working Circle	696
Local Supply/ Community Forestry W.C	6749
Watershed Forests W.C	1499
Mangrove W.C	76
Protected Areas System WC	1220
Total Area under management plans	27439
Forest area not under management plan	7683
Total Forest Area 2000 Table 1	35122

Similarly information updated for 2005 with the help of Protection Area System for 2004 and plantation area in 2005 (planned).

Type of Working Circles	Area in 000 hectares (2005)
Non Wood Forest Products W.C	5182
Production Working Circle	12017
Plantations Working Circle	849
Local Supply/ Community Forestry W.C	6749
Watershed Forests W.C	1499
Mangrove W.C	76
Protected Areas System WC	4901
Total Area under management plans	31273
Forest area not under management plan	2936
Total Forest Area 2000 Table 1	34209

Other wooded classification data is not available except that all this class falls into multipurpose zone.

3.3 Analysis and Processing of National Data

3.3.1 Calibration

This step is not needed.

3.3.2 Estimation and Forecasting

This step is not needed.

3.4 Reclassification into FRA 2005 Classes

A. For Area under Primary Function

For 1990

National Category	Percentage of a National Class into a FRA 2005 classes – Primary Function					
	Prod F/OWL	Prot F/OWL	Conservation of Biodiversity	Social function	Multiple function	Unknown function
Forests						
Teak Selection WC	**100**					
Teak Eradication WC	**100**					
Hardwood supply WC	**100**					
Public Forest WC					**100**	
Local Supply WC	**100**					
Cutch Working Circle					**100**	
Fuelwood Working Circle	**100**					
Tidal Forest Working Circle					**100**	
Special Working Circles		**100**				
Protected Areas Systems WC			**100**			
Forest area not under management plans					**100**	
Other wooded land					**100**	

For 2000 and 2005

National Category	Percentage of a National Class into a FRA 2005 classes -Primary Function					
	Production	**Protection**	**CBD**	**Social**	**Multiple**	**Unknown**
Forest						
Non Wood Forest Product WC	**100**					
Production Working Circle	**100**					
Plantations Working Circle	**100**					
Local Supply/ Community Forestry W.C	**100**					
Watershed Forests W.C		**100**				
Mangrove W.C					**100**	
Protected Areas System W.C			**100**			
Forest area not under management plans					**100**	
Other wooded land					**100**	

B. For Area under Total Area with Function

For 1990

National Category	Percentage of a National Class into a FRA classes – Total Area Function					
	Production	**Protection**	**CBD**	**Social**	**Multiple**	**Unknown**
Forests						
Teak Selection WC	**100**					
Teak Eradication WC	**100**					
Hardwood supply WC	**100**					
Public Forest WC	**100**	**100**	**100**	**100**		
Local Supply WC	**100**					
Cutch Working Circle	**100**	**100**	**100**	**100**		
Fuelwood Working Circle	**100**					
Tidal Forest Working Circle	**100**	**100**	**100**	**100**		
Special Working Circles		**100**	**100**	**100**		
Protected Areas Systems WC			**100**	**100**		
Forest area not under management plans	**100**	**100**	**100**	**100**		
Other wooded land	**100**	**100**	**100**	**100**		

For 2000 and 2005

National Category	Percentage of a National Class into a FRA class – Total Area Function					
	Production	**Protection**	**CBD**	**Social**	**Multiple**	**Unknown**
Forests						
Non Wood Forest Product WC	**100**					
Production Working Circle	**100**					
Plantations Working Circle	**100**					
Local Supply/ Community For. W.C	**100**					
Watershed Forests W.C		**100**	**100**	**100**		
Mangrove W.C	**100**	**100**	**100**	**100**		
Protected Areas System W.C		**100**	**100**	**100**		
Forest area not under management plans	**100**	**100**	**100**	**100**		
Other wooded land	**100**	**100**	**100**	**100**		

3.5 Data for National Reporting Table T3

FRA 2005 Categories / Designated function	Area (1000 hectares)					
	Primary function			Total area with function		
	1990	2000	2005	1990	2000	2005
Forest						
Production	4422	24644	24797	38187	31835	25822
Protection of soil and water	312	1499	1499	1032	9910	7425
Conservation of biodiversity	720	1220	4901	1032	9910	7425
Social services				1032	9910	7425
Multiple purpose	33765	7191	1025	not appl.	not appl.	not appl.
No or unknown function				not appl.	not appl.	not appl.
Total - Forest	39219	34554	32222	**not appl.**	**not appl.**	**not appl.**
Other wooded land						
Production				10219	10629	10834
Protection of soil and water				10219	10629	10834
Conservation of biodiversity				10219	10629	10834
Social services				10219	10629	10834
Multiple purpose	10219	10629	10834	not appl.	not appl.	not appl.
No or unknown function				not appl.	not appl.	not appl.
Total – Other wooded land	10219	10629	10834	**not appl.**	**not appl.**	**not appl.**

3.6 Comments for National Reporting Table T3

4 Table T4 Characteristics of Forest and Other wooded land

4.1 FRA 2005 Categories and Definitions

Category	Definition
Primary	Forest / Other wooded land of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed.
Modified Natural	Forest / Other wooded land of naturally regenerated native species where there are clearly visible indications of human activities.
Semi-Natural	Forest / Other wooded land of native species, established through planting, seeding or assisted natural regeneration.
Productive plantation	Forest / Other wooded land of introduced species and in some cases native species, established through planting or seeding mainly for production of wood or non wood goods.
Protective plantation	Forest / Other wooded land of native or introduced species, established through planting or seeding mainly for provision of services.

4.2 National Data

4.2.1 Data Sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)
GOM. 2004. Plantation database (unpublished). Forest Department, Planning and Statistics Div	M	Plantation area	Till 20004

4.2.2 National Classification and Definitions

No relevant national classification and definitions are available for this table.

4.2.3. National Data

Following table presents forest area under plantation from plantation database of Forest Department. The figures for 1990, 2000, 2003 data are actual figures and that for 2005 data is based on target set for 2005 by the Forest Department.

Year	Forest Area under Plantations (000 hectares)
1990	394
2000	696
2003	788
2005	849

4.3 Analysis and processing of national data

4.3.1 Calibration

The step of calibration is not necessary.

4.3.2 Estimation and forecasting

National information is not available in FRA 2005 classes. Therefore, most of the information from Table 3 has been used with following assumptions to generate figures for this table.

FRA 2005 Category	**Basis for providing information**
Primary Forests	No information is available hence treated as NIL
Modified	Forest except forest under Plantation Working Circles.
Semi natural	No information is available hence treated as NIL
Productive Plantation	88 % of Percent of total plantation
Protective Plantation	12 % of Percent of total plantation
Primary "Other wooded lands"	NIL
Modified Other Wooded Lands	All "other wooded lands" in table 1
Semi- Natural "Other Wooded Lands"	NIL

4.4 Reclassification into FRA 2005 Classes

Table: Reclassification (Percentage allocation) into FRA 2005 classes

	Primary Forest	Modified Forest	Semi-Natural	Production Plantation	Protection Plantation	Modified OWL
Forests under management plans except (PAS & Plantations areas)		100				
Forest area not under management plans		100				
Total Plantation Areas				88	12	
Protected Areas		100				
Other Wooded Land						100

4.5 Data for National reporting table T4

FRA 2005 Categories	**Area (1000 hectares)**					
	Forest			**Other wooded land**		
	1990	**2000**	**2005**	**1990**	**2000**	**2005**
Primary	NDA	NDA	NDA	NDA	NDA	NDA
Modified natural	38825	33858	31373	10219	10629	10834
Semi-natural	NDA	NDA	NDA			
Productive plantation	323	571	696			
Protective plantation	71	125	153			
TOTAL	39219	34554	32222	10219	10629	10834

4.6 Comments for National Reporting Table T4

It may be noted that plantations have not been differentiated into indigenous and exotic (introduced species) but based on their purpose (productive or protective). The forest department raises four types of forest plantation (commercial, industrial, village supply and watershed Plantation). The first three types are for the purpose of production and the last (watershed plantation) type is for the protection purpose.

5 Table T5 Forest growing Stock

5.1 FRA 2005 Categories and Definitions

Category	Definition
Growing stock	Volume over bark of all living trees more than X cm in diameter at breast height (or above buttresses if these are higher). Includes the stem from ground level or stump height up to a top diameter of Y cm, and may also include branches to a minimum diameter of W cm.
Commercial growing stock	The part of the growing stock of species that are considered as commercial or potentially commercial under current market conditions, and with a diameter at breast height of Z cm or more.

5.2 National Data

5.2.2 National Data Sources

Inventory Section, Planning and Statistics Division, Forest Department, Ministry of Forestry is responsible for the assessment of forest growing stock data in Myanmar. Working Plan Division of Forest Department has been implementing all kinds of forest surveys since 1850. Up to 1980s Forest Department has relied on cent percent surveys of teak and hardwoods from enumeration process during teak girdling operation and Selection Marking operation of Hardwood for felling. Modern sampling techniques have been given priority over convention methods since 1990. With the aid of remote sensing, GIS and computer databases, national forest inventory is being carried out each year with prescribed planning of 5 years intervals.

5.2.2 National Classification and Definitions

The following table describes national classification of growing stock and commercial growing stock used.

Classification	Definition
Growing Stock	The sum-total of all trees, by number and or volume or biomass, growing within a particular area of interest.
Commercial growing stock (meaning growing stock of commercial tree species**)**	Growing stock of tree species and groups prescribed by the Forest Department and Myanmar Timber Enterprise as commercial. Teak is in its own class, others are Group 1, 2,3,4,5 and others. Group 1 includes hard woods such as *Xylia xylocarpa*, Paduak (*Pterocarpus macroparus*). Durability and values are highest in Group 1 and decrease follow with the group number.

5.2.3 Original National Data

The data submitted during FRA2000 process were the growing stock data which were the outcome from the series of inventoried data from the States and Division. They are not national data.

The year 2000 data has been analyzed directly from computerized inventory data. However, year 1990 data is available only in hard copy print outs and area also covers only six States and Divisions. Data has to be put into excel format for analysis. Calibration for Union data is

performed by using the RS/GIS generated forest cover data. No assumptions have been made in calculating the commercial growing stock.

Classification	**1990**	**2000**
Total (All species) Growing Stock (million cubic meters)	2,803	2,869
Commercial Growing Stock (million cubic meters)	1,344	799
Area covered by Total Growing stock estimations (000 ha)	37871	35268
Per hectare Total Growing stock (cubic meter per hectare)	74.01	81.35

The above data indicates that the volume increase is not in correlation with decrease in forest cover. The volume equations used are commercial volume tables and they have been applied to each species group or to individual.

5.3 Analysis and Processing of National Data

5.3.1 Calibration

Calibration is considered not necessary.

5.3.2 Estimation and Forecasting

Estimation is not needed for 1990 and 2000 as per hectare growing stock figures are available. The figure of per hectare growing stock for 2005 has been calculated by linear interpolation {figure of 2000+ (figure of 2000-figure of 1990)/10)*5}. These per hectare figures were then multiplied with forest area figures in Table 1 to estimate total growing stock in 1990, 2000 and 2005.

Variables	**1990**	**2000**	**2005**
Per hectare Growing Stock (cubic meter/ha)	74.01	81.35	85.02
Forest Area in Table 1 (000 ha)	39219	34554	32222
Total Growing Stock (million m^3)	**2903**	**2811**	**2740**

For the commercial growing stock for 2005, first the actual percent of commercial growing stock to total growing stock were calculated for 1990 and 2000 and the percent for 2005 was forecasted using linear interpolation method. These percentages were then applied to estimates of total growing stock to develop figures for 1990, 2000 and 2005.

Variables	**1990**	**2000**	**2005**
Ratio of commercial to total growing stock	47.95	27.85	17.80
Total Growing Stock (million cubic m^3)	2903	2811	2740
Commercial Growing Stock (million cubic m^3)	**1392**	**783**	**488**

5.4 Reclassification into FRA 2005 Classes

The step is not necessary.

5.5 Data for National reporting table T5

FRA 2005 Categories	Volume (million cubic meters over bark)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Growing stock	2903	2811	2740	n.a.	n.a.	n.a.
Commercial growing stock	1392	783	488	n.a.	n.a.	n.a.

Supplementary Information

Specification of country threshold values	Unit	Value
1. Minimum diameter at breast height of trees included in Growing stock (X)	cm	20
2. Minimum diameter at the top end of stem (Y) for calculation of Growing stock	cm	10
3. Minimum diameter of branches included in Growing stock (W)	cm	Not included
4. Minimum diameter at breast height of trees in Commercial growing stock (Z)	cm	20
5. Volume refers to “Above ground” (AG) or “Above stump” (AS)	AG / AS	AS
6. Have any of the above thresholds (points 1 to 4) changed since 1990	Yes/No	No
7. If yes, then attach a separate note giving details of the change	Attachment	-

5.6 Comments to National reporting table T5

During sampling survey (inventory) all living trees over 20cm diameter at breast height (1.3m) are measured in a sampling survey. For Volume equation, sample trees are measured from 30cm above ground to the crown point and it is taken as stem length and volume is calculated. The branches etc. are not measured and their volume is not included in the growing stock. This means growing stock given is the marketable part (as timber) above the stump.

6 Table T6 Biomass Stock of Forests

6.1 FRA 2005 Categories and Definitions

Category	Definition
Above-ground biomass	All living biomass above the soil including stem, stump, branches, bark, seeds, and foliage.
Below-ground biomass	All living biomass of live roots. Fine roots of less than 2mm diameter are excluded because these often cannot be distinguished empirically from soil organic matter or litter.
Dead wood biomass	All non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. Dead wood includes wood lying on the surface, dead roots, and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country

6.2 National Data

6.2.1 National Data Sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)
GPG, 2003. Good Practise Guidance for Land-use, Land-use Change and Forestry. IPCC.	H	Basic Densities, Root: Shoot Ratio, Dead to Live Ration	
Sandra Brown, 1997. Estimating Biomass Change in Topical Forests. A Primer. FAO Forestry Paper No. 134.	H	Biomass Expansion Factor	

6.2.2 National Classification and Definitions

This data may be a little conservative because the volume tables used by the National Forest Inventory are commercial timber volume tables (not including branches and others)

6.2.3 Original National Data

There is no data on biomass. This table uses data from Table 5.

6.3 Analysis and Processing of National Data

6.3.1 Calibration

Not required.

6.3.2 Estimation and Forecasting

A. Weighted Density 1990

Species in 1990	Volume (million m^3)	Basic density (tonnes/ m^3)	Stem Biomass (million tonnes)	Weighted Density
Xylia xylocarpa	285.44	0.73	208.37	
Tectona grandis	241.91	0.50	120.96	
Dipterocarpus tuberculatus	221.4	0.61	135.05	
Dipterocarpus spp.	196.05	0.61	119.59	
Terminalia tomentosa	111.61	0.73	81.48	
Pentacme siamensis	103.51	0.56	57.97	
Shorea oblongifolia	65.42	0.72	47.10	
Eugenia spp.	59.41	0.65	38.62	
Millettia pendula	37	0.50	18.50	
Protium serrata	18.3	0.50	9.15	
Rest Of Species	1462.67	0.50	731.34	
Total	**2802.71**		**1568.12**	**0.56**

(Note: Basic density figures are from GPG, 2003 expect for last three which have been assumed as 0.5)

B. Weighted Density 2000

Species in 1990	Volume (million cubic m^3)	Basic density (tonnes/ m^3)	Stem Biomass (million tonnes)	Weighted Density
Tectona grandis	149.4	0.50	74.70	
Eugenia spp.	96.95	0.65	63.02	
Dipterocarpus tuberculatus	75.98	0.61	46.35	
Terminalia tomentosa	58.09	0.73	42.41	
Xylia xylocarpa	46.65	0.73	34.05	
Protium serrata	44.48	0.50	22.24	
Pentacme siamensis	41.46	0.56	23.22	
Shorea oblongifolia	19.92	0.72	14.34	
Quercus spicata	17.54	0.70	12.28	
Melanorrhoea usitata	9.15	0.63	5.76	
Rest of Species	2309.42	0.50	1154.71	
Total	**2869.04**		**1493.08**	**0.52**

C. Weighted density for 2005

It has been forecasted as 0.50 using figures of 1990 and 2000 and following linear-extrapolation method.

D. Stem Biomass

The following stem biomass has been calculated using the total growing stock figures from Table 5 and weighted densities form above.

Variable	1990	2000	2005
Weighted densities	0.56	0.52	0.50
Total Growing Stock	2903	2811	2740
Stem biomass (million m3)	1625	1462	1370
Area Table 1	39219	34554	32222
Per hectare Stem Biomass	41.45	42.30	42.51

E. Biomass Expansion Factor (BEF)

The BEF has been calculated by using the following formula, (Sandra Brown, 1997).

BEF = EXP (3.213-0.506*LN(Stem biomass per hectare))

Variable	1990	2000	2005
BEF	3.78	3.74	3.73

F. Total Biomass

The Above Ground Biomass has been calculated by multiplying Stem biomass by BEF. The Below Ground Biomass has been calculating following GPG, 2003 default "root to shoot ratio" of 0.24. Similarly, Deadwood Biomass has been calculated using GPG, 2003 default "dead to live ratio" of 0.11.

Variables	1990	2000	2005
Above Ground Biomass (million tonnes)	6144	5467	5109
Root : Shoot ratio	0.24	0.24	0.24
Below Ground Biomass (million tonnes)	1475	1312	1226
Total Live Biomass (million tonnes)	7619	6779	6335
Dead to Live ratio	0.11	0.11	0.11
Dead Wood Biomass (million tonnes)	838	746	697

6.4 Reclassification into FRA 2005 classes

This step is not necessary.

6.5 Data for National reporting table T6

FRA 2005 Categories	Biomass (million metric tonnes oven-dry weight)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Above-ground biomass	6144	5467	5109	n.a.	n.a.	n.a.
Below-ground biomass	1475	1312	1226	n.a.	n.a.	n.a.
Dead wood biomass	838	746	697	n.a.	n.a.	n.a.
TOTAL	8457	7525	7032	n.a.	n.a.	n.a.

6.6 Comments to National reporting table T6

7 Table T7 Forest Carbon

7.1 FRA 2005 Categories and definitions

Category	Definition
Carbon in above-ground biomass	Carbon in all living biomass above the soil, including stem, stump, branches, bark, seeds, and foliage.
Carbon in below-ground biomass	Carbon in all living biomass of live roots. Fine roots of less than 2 mm diameter are excluded, because these often cannot be distinguished empirically from soil organic matter or litter.
Carbon in dead wood biomass	Carbon in all non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. Dead wood includes wood lying on the surface, dead roots, and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country.
Carbon in litter	Carbon in all non-living biomass with a diameter less than a minimum diameter chose by the country for lying dead (for example 10 cm), in various states of decomposition above the mineral or organic soil. This includes the litter, fumic, and humic layers.
Soil carbon	Organic carbon in mineral and organic soils (including peat) to a specified depth chosen by the country and applied consistently through the time series.

7.2 National data

7.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)
GPG, 2003. Good Practise Guidance for Land-use, Land-use Change and Forestry. IPCC.	H	Biomass to carbon factors	

This table basically utilises information from Table 6 and uses GPG.2003 factors to estimate carbon stocks.

7.2.2 Classification and definitions

There are no national classes or definition relevant for this table.

7.2.3 Original data

This table utilises information in Table 6.

7.3 Analysis and processing of national data

7.3.1 Calibration

This step is not necessary

7.3.2 Estimation and forecasting

A. Carbon in Live and dead Biomass

The GPG default factor of 0.5 is being used to convert biomass figures into carbon stock figures

B. Carbon in Litter

The GPG (2003) default factor of 2.1 tonnes/ ha is adopted for evergreen, mixed, deciduous and bamboo forest areas.

All above assumptions lead to following estimates of carbon stocks in Myanmar forests.

Variables	Units	FRA Reference Years		
		1990	2000	2005
Carbon in Above Ground Biomass	million tonnes	3072	2733	2555
Carbon in Below Ground Biomass	million tonnes	737	656	613
Carbon in Dead Wood Biomass	million tonnes	419	373	348
Forest Area Table1	000 ha	39219	34554	32222
Per ha Carbon in forest litter	tonnes/ha	2.1	2.1	2.1
Carbon in Forest Litter	million tonnes	82	73	68

7.4 Reclassification into FRA 2005 classes

This step is not necessary.

7.5 Data for National reporting table T7

FRA 2005 Categories	Carbon (Million metric tonnes)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Carbon in above-ground biomass	3072	2733	2555	n.a.	n.a.	n.a.
Carbon in below-ground biomass	737	656	613	n.a.	n.a.	n.a.
Sub-total: Carbon in living biomass	**3809**	**3389**	**3168**	n.a.	n.a.	n.a.
Carbon in dead wood	419	373	348	n.a.	n.a.	n.a.
Carbon in litter	82	73	68	n.a.	n.a.	n.a.
Sub-total: Carbon in dead wood and litter	**501**	**446**	**416**	n.a.	n.a.	n.a.
Soil carbon to a depth of _____ cm	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
TOTAL CARBON	**4310**	**3835**	**3584**	n.a.	n.a.	n.a.

7.6 Comments to National reporting table T7

8 Table T8 Disturbances affecting Health and Vitality

8.1 FRA 2005 Categories and Definitions

Forest Fire	An unplanned fire in the "Forest" and or "Other Wooded Land", whether it broke out inside or outside the "Forest" or the "Other Wooded Land".
Forest Insect	A forest insect is an animal belonging to the class Hexapoda with its habitat in "Forest" and "Other Wooded Land".
Forest Disease	A condition caused by living organisms or environmental changes that impairs the normal functions of tree or Forest.

8.2 National Data

8.2.1 National Data Sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)
Goldammer. J. G. 1986. Forest Fire Management. Field Document No. 5 Fo:DP/BUR/81/001. FAO. Rome. 1986	M	Fire Damage	1986
Teaknet. 2001. Teaknet Newsletter. Vol. 22. May 2002. A quarterly newsletter. Forest Department, Bayintnaung Road, Gyogon, Yangon, Myanmar..	M	Fire Damage	2001

8.2.2 National Classification and Definitions

8.2.3 Original National Data

There is no regular record keeping of such damages except in some research studies. Further, a wide range of the natural forests and mature plantations in Myanmar are excluded from fire protection schemes due to inadequate budgetary support and limitations of supervision. However, a consultant has made an estimation in 1986 that about 6.5 millions hectares of forest land is annually affected from forest fire.

8.3 Analysis and Processing of National Data

8.3.1 Calibration

This step is not considered necessary

8.3.2 Estimation and Forecasting

Not necessary

8.4 Reclassification into FRA 2005 Classes

Not necessary

8.5 Data for National Reporting Table T8

FRA-2005 Categories	Average annual area affected (1000 hectares)			
	Forests		Other wooded land	
	1990	2000	1990	2000
Disturbance by fire	6500	6500	n.a.	n.a.
Disturbance by insects	n.a.	n.a.	n.a.	n.a.
Disturbance by diseases	n.a.	n.a.	n.a.	n.a.
Other disturbance	n.a.	n.a.	n.a.	n.a.

8.6 Comments for National Reporting Table 8

9 Table T9 Diversity of Tree Species

9.1 FRA 2005 Categories and definitions

Category	Definition
Number of native tree species	The total number of native tree species that have been identified within the country
Number of critically endangered tree species	The number of native tree species that are classified as "Critically endangered" in the IUCN red list.
Number of endangered tree species	The number of native tree species that are classified as "Endangered" in the IUCN red list.
Number of vulnerable tree species	The number of native tree species that are classified as "Vulnerable" in the IUCN red list.

9.2 National data

9.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)
IUCN. 2004. IUCN Red List of Threatened species at its website.	H	Species	2004
Kress. W. J. 2003. A checklist of the trees, shrubs, herbs, and climbers of Myanmar. National museum of natural history. Washington, D.C.	H	Species	2003

9.2.2 Classification and definitions

No information is available on the national classes or definitions related to this table.

9.2.3 Original data

The "A checklist of the trees, shrubs, herbs, and climbers of Myanmar by W. John Kress" embraces 7050 species in 285 families and 2254 genera, of which about 2000 or 28.5 percent are trees and small trees.

The website of IUCN, Red List 2004 provides following information on critically endangered, endangered and vulnerable species in Myanmar.

A. Critically Endangered - 13 species

1	Anisoptera scaphula
2	Dipterocarpus baudii
3	Dipterocarpus dyeri
4	Dipterocarpus gracilis
5	Dipterocarpus grandiflorus
6	Dipterocarpus kerrii
7	Dipterocarpus turbinatus
8	Hopea apiculata

9	Hopea helferi
10	Hopea sangal
11	Parashorea stellata
12	Shorea farinosa
13	Vatica lanceaefolia

B. Endangered Species – 12

1	Afzelia xylocarpa
2	Anisoptera costata
3	Cleidiocarpon laurinum
4	Dalbergia oliveri
5	Dipterocarpus alatus
6	Dipterocarpus costatus
7	Hopea ferrea
8	Picea farreri
9	Shorea gratissima
10	Shorea henryana
11	Shorea roxburghii
12	Vatica cinerea

C. Vulnerable Species- 12 Species

1 Aquilaria malaccensis
2 Burretiodendron esquirolii
3 Calocedrus macrolepis
4 Cephalotaxus mannii
5 Cleidiocarpon cavaleriei
6 Dipterocarpus retusus
7 Hopea griffithii
8 Hopea odorata
9 Intsia bijuga
10 Magnolia rostrata
11 Pterocarpus indicus
12 Taiwania cryptomerioides

9.3 Analysis and Processing of National Data

9.3.1 Calibration

This step is not necessary.

9.3.2 Estimation and Forecasting

This step is not necessary.

9.4 Reclassification into FRA 2005 Classes

This step is not necessary.

9.5 Data for National Reporting Table T9

FRA 2005 Categories	Number of species (year 2000)
Native tree species	2000
Critically endangered tree species	13
Endangered tree species	12
Vulnerable tree species	12

9.6 Comments to National reporting table T9

10 Table T10 Growing stock composition

10.1 FRA 2005 Categories and Definitions

Growing Stock Composition	The composition of "growing stock" in "Forest" by ten most common (by volume) tree species in forests.

10.2 National Data

10.2.1 National Data Sources

The records of the Planning and Statistics Division of Forest Department, which has been conducting NFI (National Forest Inventory) since 1982.

10.2.2 National Classification and Definitions

No national standard definition and classification are available

10.2.3 National Data

No.	Myanmar Name	Scientific Name	volume (million cubic meters)	Myanmar Name	Scientific Name	volume (million cubic meters)
	1990			2000		
1	Pyinkado	*Xylia xylocarpa*	285.44	Kyun	*Tectona grandis*	149.40
2	Kyun	*Tectona grandis*	241.91	Thabye	*Eugenia spp.*	96.95
3	In	*Dipterocarpus tuberculatus*	221.40	In	*Dipterocarpus tuberculatus*	75.98
4	Kanyin	*Dipterocarpus spp.*	196.05	Taukkyan	*Terminalia tomentosa*	58.09
5	Taukkyan	*Terminalia tomentosa*	111.61	Pyinkado	*Xylia xylocarpa*	46.65
6	Ingyin	*Pentacme siamensis*	103.51	Thadi	*Protium serrata*	44.48
7	Thitya	*Shorea oblongifolia*	65.42	Ingyin	*Pentacme siamensis*	41.46
8	Thabye	*Eugenia spp.*	59.41	Thitya	*Shorea oblongifolia*	19.92
9	Thinwin	*Millettia pendula*	37.00	Sagat	*Quercus spicata*	17.54
10	Thadi	*Protium serrata*	18.30	Thitsi	*Melanorrhoea usitata*	9.15
	Rest		1462.67	Rest		2309.42
	Total		2802.71	Total		2869.04

10.3 Analysis and Processing of National Data

10.3.1 Calibration

The data has been calibrated to match the total growing stock in Table 5.

10.3.2 Estimation and Forecasting

Not considered necessary.

10.4 Reclassification into FRA 2005 Classes

This step is not necessary

10.5 Data for National Reporting Table T10

The order of species has been organised according to the year 2000. Therefore in 1990 column order of species does not follow their growing stock levels. The original data has been proportionally calibrated to match the growing stock total in Table 5.

FRA 2005 Categories **Common name**	**FRA 2005 Categories** **Species name**	**Growing Stock in Forests** **(million cubic meters)**	
		1990	**2000 (base)**
Kyun	*Tectona grandis*	251	146
Thabye	*Eugenia spp.*	62	95
In	*Dipterocarpus tuberculatus*	229	74
Taukkyan	*Terminalia tomentosa*	116	57
Pyinkado	*Xylia xylocarpa*	296	46
Thadi	*Protium serrata*	19	44
Ingyin	*Pentacme siamensis*	107	41
Thitya	*Shorea oblongifolia*	68	20
Sagat	*Quercus spicata*	n.a.	17
Thitsi	*Melanorrhoea usitata*	n.a.	9
Rest of spp.	Rest of Species	1755	2263
TOTAL	TOTAL	2903	2811

10.6 Comments for National Reporting Table 10

Based on the data for 1990 and 2000 species composition, the composition of shade bearers such as *Xylia xylocarpa* significantly decreased, the composition of the light demanding species such as teak also decreased and *Dipterocarpus spp*. is no longer found in the list of ten most frequent species. It can be assumed that the valuable species composition has comparatively decreased within 10 years.

11 Table T11 Wood Removal

11.1 FRA 2005 Categories and definitions

Category	Definition
Industrial wood removal	The wood removed (volume of round wood over bark) for production of goods and services other than energy production (wood fuel).
Wood fuel removal	The wood removed for energy production purposes. regardless whether for industrial. Commercial or domestic use.

11.2 National data

11.2.1 Data sources

References to sources of Information	Quality (H/M/L)	Variable(s)	Year(s)
GOM. 2003. Annual Reports (1992-93 to 2003-04) of Myanmar Timber Enterprise. Myanmar.	M	Wood Removal	1990 to 2003
GOM. 2004. Departmental Database of Planning and Statistics Division. Forest Department. Myanmar.	M	Wood fuel Removal	1990 to 2003

Main Source for round wood removal data is extracted from annual report (1992-93 to 2003-04) of Myanmar Timber Enterprise. Woodfuel removal data is compiled from the departmental data base of planning and Statistics Forest Department Division. No data exists for other land with trees.

11.2.2 National Classification and Definitions

Not national classes or definitions are available.

11.2.3 Original Data

(Million cubic metres)

Round Wood Removal	1990-91	1991-02	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
Industrial Round Wood	3.57	3.44	3.18	3.19	2.62	2.65	2.81	3.18	3.28	3.35	3.57	3.94	3.88	3.88
Fuelwood	32.27	32.22	32.38	32.40	32.48	31.46	31.96	31.14	31.75	33.14	33.49	34.20	34.94	35.66
Total	35.84	35.66	35.56	35.59	35.10	34.10	34.78	34.31	35.03	36.49	37.06	38.13	38.81	39.55

11.3 Analysis and Processing of National Data

11.3.1 Calibration

This step is considered not necessary.

11.3.2 Estimation and Forecasting

This average for 1990 has been calculated using three years data 1990 to 1993. The average for 2000 has been calculated using five year data from 1998 to 2002. The figure for 2005 has been calculated by averaging last two years data (2002 and 2003).

11.4 Reclassification into FRA 2005 Classes

Table: Reclassification (Percentage allocation) into FRA 2005 classes

National Classification	Percentage of a National Class to a FRA Class	
	Industrial Round Wood	Wood Fuel
Wood	100	
Fuelwood		100

11.5 Data for National Reporting Table T11

FRA 2005 Categories	Volume in 1000 cubic meters of roundwood over bark					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Industrial roundwood	3397	3604	3880	n.a.	n.a.	n.a.
Woodfuel	35687	37104	39180	n.a.	n.a.	n.a.
TOTAL for Country	39084	40708	43060	n.a.	n.a.	n.a.

11.6 Comments to National reporting table T11

12 Table T12 Value of Wood Removal

12.1 FRA 2005 Categories and definitions

Category	Definition
Value of industrial wood removal	Value of the wood removed for production of goods and services other than energy production (woodfuel).
Value of woodfuel removal	Value of the wood removed for energy production purposes. regardless whether for industrial. commercial or domestic use.

12.2 National data

12.2.1 Data sources

No documented source is available. The value of wood and fuelwood is calculated based on annual prevailing prices.

12.2.2 Classification and definitions

No national Classification and definitions are available.

12.2.3 Original National Data

The data of wood removal is converted to value by using prevailing prices in Myanmar currency (Kyats).

(Kyats in Million)

	1990-91	1991-02	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
Industrial Round Wood	29710	40800	56331	68802	78545	94818	122178	177951	236805	278956	318215	493070	720766	855575
Fuelwood	8952	10152	11587	13176	14991	16493	19045	21076	24416	28961	33240	38551	44760	51901
Total	38662	50952	67918	81978	93536	111311	141223	199027	261221	307917	351455	531621	765526	907476

12.3 Analysis and Processing of National Data

12.3.1 Calibration

Not considered necessary.

12.3.2 Estimation and Forecasting

The reporting figures for 1990, 2000 and 2005 have been developed as under,

(a) For 1990- Taking three year average (1990 to 1992) since data for 1988 and 1999 is not available.
(b) For 2000 - Taking five year averages of data from 1998 to 2002.

(c) For 2005 – Taking two year average (2002 and 2003) since data for 2004 is not available.

12.4 Reclassification into FRA 2005 Classes

No Reclassification is necessary .

12.5 Data for National reporting table T12

FRA 2005 Categories	Value of roundwood removal (1000 USD)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Industrial roundwood	384367	910139	838479	n.a.	n.a.	n.a.
Woodfuel	93003	75524	51415	n.a.	n.a.	n.a.
Total for Country	477370	985662	889895	n.a.	n.a.	n.a.

(Exchange rates of 1 US$ for 1990 (110 Kyats) ,2000 (450 Kyats) and 2005 (940 Kyats) taken from prevailing price at respective year

12.6 Comments to National reporting table T12

13 Table T13 Non Wood Forest Products (NWFP) Removal

13.1 FRA 2005 Categories and definitions

The following categories of non-wood forest products have been defined:

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

13.2 National data

13.2.1 Data sources

The Planning and Statistics Division in the Forest Department compiles the data based on monthly, quarterly and annual report from states and divisions of the country. However, it does not provide national totals because it maintains reporting units of the states and divisions and it does not convert the basic units into a single unit like metric tonne. Further, information on removal of NWFP is available only for the part that is used commercially.

13.2.2 Classification and definitions

There are no standard national definitions for NWFP.

13.2.3 Original National Data

A. Conversion factors

The data in multiple units in forest statistics was converted to a single unit “metric tonnes” by using following conversion factors to provide national yearly removals.

NWFP	Original Unit	Conversion for Metric tonne.
Bamboos	Nos. (000)	120nos./ton
Rattan	Nos. (000)	1200nos/ton
Cutch	Viss	1*3.6/2240
Barks	Viss	1*3.6/2241
Indwe	Viss	1*3.6/2244
Thanakha	Viss	1*3.6/2245
Thatch	Nos. (000)	1200nos/ton
Bat Guano	Viss	1*3.6/2248
Thinbaung	Nos. (000)	100/ton

B. Removal of NWFPs (000 metric tonnes)

Year	Removal of NWFP (in 000 metric tonnes)								
	Bamboos	Rattan	Cutch	Barks	*Indwe*	*Thanakha*	Thatch	Bat Guano	Thinbaung
1990-91	1179	40	0	1	1	1	72	0	13
1991-92	1237	51	0	1	1	0	90	0	8
1992-93	1084	47	0	1	1	0	81	0	19
1993-94	853	48	0	2	1	0	86	0	20
1994-95	942	47	0	3	1	0	71	0	13
1995-96	929	65	0	1	1	0	69	0	8
1996-97	1212	26	0	2	0	0	61	0	14
1997-98	941	13	0	3	0	0	59	0	2
1998-99	793	6	0	1	0	0	44	0	1
1999-00	1008	23	0	4	0	0	79	0	6
2000-01	987	16	0	3	0	0	91	0	6
2001-02	1166	10	1	3	0	0	99	0	7
2002-03	1320	18	0	2	0	0	98	1	7
2003-04	1419	17	0	3	0	0	105	1	7

13.3 Analysis and Processing of National Data

13.3.1 Calibration

This step is not considered necessary

13.3.2 Estimation and Forecasting

The reporting figures for 1990, 2000 and 2005 have been developed as under,

(d) For 1990- Taking three year average (1990 to 1992) since data for 1988 and 1999 is not available.
(e) For 2000 - Taking five year averages of data from 1998 to 2002.
(f) For 2005 – Taking two year average (2002 and 2003) since data for 2004 is not available.

13.4 Reclassification into FRA 2005 Classes

National Class	Percentage a National class that falls in a FRA class of NWFP							
	1	2	3	4	5	6	7	16
	Food	Fodder	Raw aromatic	Raw dyes	Raw for construction	Ornamental	Exudates	Other non-edibles animal products
Bamboos					100			
Rattan					100			
Cutch				100				
Barks				100				
Indwe							100	
Thanakha			100					
Thatch					100			
Bat Guano								100
Thinbaung					100			

13.5 Data for National Reporting Table T13

Table: Input to Global Reporting Table

FRA 2005 Category	Scale	Unit	NWFP Removal		
			1990	2000	2005
Plant products / raw material					
1. Food	000	Tonnes			
2. Fodder	000	Tonnes			
3. Raw material for medicine and aromatic products	000	Tonnes	1	0	0
4. Raw material for colorants and dyes	000	Tonnes	1	3	3
5. Raw material for utensil, Handicrafts & construction	000	Tonnes	1307	1157	1496
6. Ornamental plants	000	Tonnes			
7. Exudates	000	Tonnes	1	0	0
8. Other plant product	000	Tonnes			
Animal Product/ raw material					
9. Living animals	000	Tonnes			
10. Hides, skins and trophies	000	Tonnes			
11. Wild honey and bee-wax	000	Tonnes			
12. Bush meat					
13. Raw material for medicine					
14. Raw material for colorants					
15. Other edibles animal products	000	Tonnes			
16. Other non-edibles animal products	000	Tonnes	0	0	1
Total			**1310**	**1160**	**1500**

13.6 Comments to National reporting table T13

Table T14 Value of Non Wood Forest Product Removal

14.1 FRA 2005 Categories and definitions

The following categories of non-wood forest products have been defined:

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

14.2 National data

14.2.1 Data sources

The National Planning Department fixes price of forest products including NWFPs. The prices are revised yearly based on growth rates. It has no relation with production of NWFPs.

14.2.2 National Classification and Definitions

No national definitions are available.

14.2.3 Original National Data

The value is based on annual fixed prices of NWFPs. The current prevailing prices of NWFPs may be much higher than fixed values.

(Kyats in Million)

Sr.	Particular	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
1	Bamboos	212	267	299	358	565	669	1454	1129	1427	3024	4738	6296	7922	10214
2	Rattan	58	92	84	116	142	203	92	47	23	181	131	99	192	209
3	Cutch	2	1	2	4	4	4	5	7	14	23	34	58	48	30
4	Barks	7	11	12	31	50	18	45	76	34	220	170	204	229	327
5	Indwe	8	10	7	10	18	12	12	13	10	30	39	44	62	89
6	Thanakha	10	12	11	18	16	18	41	31	28	105	130	147	196	230
7	Thatch	87	129	116	206	212	249	257	247	212	662	927	1017	1022	1110
8	Bat Guano	1	1	1	1	3	4	5	5	8	22	40	49	69	81
9	Thinbaung	6	0	9	10	6	4	10	2	1	19	25	35	37	44
	Total	**390**	**523**	**543**	**755**	**1017**	**1182**	**1921**	**1557**	**1757**	**4285**	**6234**	**7950**	**9777**	**12335**

14.3 Analysis and Processing of National Data

14.3.1 Calibration

This step is not considered necessary

14.3.2 Estimation and Forecasting

The reporting figures for 1990, 2000 and 2005 have been developed as under,

(a) For 1990- Taking three year average (1990 to 1992) since data for 1988 and 1999 is not available.
(b) For 2000 - Taking five year averages of data from 1998 to 2002.
(c) For 2005 – Taking two year average (2002 and 2003) since data for 2004 is not available

14.4 Reclassification into FRA 2005 Classes

The following table indicates correspondence between national and FRA 2005 classes.

National Class	Percentage a National class that falls in a FRA class of NWFP							
	1	2	3	4	5	6	7	16
	Food	Fodder	Raw aromatic	Raw dyes	Raw for construction	Ornamental	Exudates	Other non-edibles animal products
Bamboos					100			
Rattan					100			
Cutch				100				
Barks				100				
Indwe							100	
Thanakha			100					
Thatch					100			
Bat Guano								100
Thinbaung					100			

14.5 Data for National Reporting Table T14

FRA 2005 Category	Value of NWFP Removal (000 US dollars)		
	1990	2000	2005
Plant products / raw material			
1. Food			
2. Fodder			
3. Raw material for medicine and aromatic products	100	269	227
4. Raw material for colorants and dyes	106	460	337
5. Raw material for utensils, handicrafts & const.	4118	12440	11037
6. Ornamental plants			
7. Exudates	76	82	80
8. Other plant products			
Total			
Animal products / raw material			
9. Living animals			
10. Hides, skins and trophies			
11. Wild honey and bee-wax			
12. Bush meat			
13. Raw material for medicine			
14. Raw material for colorants			
15. Other edible animal products			
16. Other non-edible animal products	9	84	80
TOTAL	4409	13335	11761

(Note: Exchange rates of 1 US$ for 1990 (110 Kyats) ,2000 (450 Kyats) and 2005 (940 Kyats) taken from prevailing price at respective year)

14.6 Comments to National reporting table T14

15 Table T15. Employment in Forestry

15.1 FRA 2005 Categories and Definitions

Primary Employment	The employment provided within the "Forest and "Other Wooded Land" by activities relating to primary (raw) production of goods, provision of services, and other primary activities.
Primary Activities	The forestry activities within the "Forest" and "Other Wooded Land". FRA 2005 classifies forestry activities into three broad classes; activities relating to "Wood Removal", "Non Wood Forest Product Removal" and "Other Primary Activities".
Other Primary Activities	The forestry activities, within the "Forest" and "Other Wooded Land", other than those related to "Wood Removal" (including "wood fuel" or "fuelwood" removal) and removal of "NWFP".

15.2 National Data

15.2.1 National Data Sources

The forestry activities within the forest area is controlled by the Forest Department and data relating to the forest operations is available, however employees concerning with wood fuel removal and NWFP removal are not available and recorded.

15.2.2 National Classification and Definitions

15.2.3 Original National Data

A. Forest Department

Employee involvement for 1990 and , 2000

Number of employees	**1990**	**2000**
Field Staff	8985	8622
Labour	79252	71855
Total	**88237**	**80477**

B Myanmar Timber Enterprise

Operation	**1990**	**2000**
Loggers	8000	7253
Skidders	8144	7384
Mechanical Operator	6352	5759
Total	**22496**	**20396**

15.3 Analysis and Processing of National Data

15.3.1 Calibration

15.3.2 Estimation and Forecasting

This step is not necessary

15.4 Reclassification into FRA 2005 Classes

Except for field staff of forest department all other employment is allocated to production. The regular staff is apportioned between production and services based on the ratio of the area under protected area system and the rest from Table 3.

Variable	**1990**	**2000**
Percent of Forest Area under PAS	2	3
Percent of the rest of Forest Area	98	97

15.5 Data for National reporting table T15

FRA 2005 Categories	**Employment (1000 person-years)**	
	1990	**2000**
Primary production of goods	110.6	100.6
Provision of services	0.2	0.3
Unspecified forestry activities		
TOTAL	110.8	100.9

15.6 Comments to National reporting table T15