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Food and Agriculture Organization of the United Nations

GLOBAL FOREST RESOURCES
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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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Contents

1 Table T1 – Extent of Forest and Other wooded land

1.1 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 sit*u. 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 sit*u; 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.

1.2 National data

1.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable (s)	Year(s)	Additional comments
GOI, 2000. RePPProT data. Forestry Planning Agency Statistic Baplan 2000. (In Indonesia)	H	Extent	1985	For 1990 data for Java. Uses remote sensing data (aerial photograph, Landsat MSS and Radar images)
GOI. 1996. Final report on Indonesia Forest Resource (In Indonesia)	H	Extent	1986 – 1991 mostly 1989	Based on Landsat MSS interpretation.
GOI. 2000. Forestry Statistic book, Ministry of Forestry (In Indonesia)	M	Extent	1999 - 2000	Landsat Imagery interpretation.
GOI, 2003. Indonesia Land Cover Recalculation 2003. (In Indonesia) Agency of Forestry Planning. Center for Forestry Mapping. Ministry of Forestry, Indonesia.	H	Extent	1999 - 2000	Above data with more detail

1.2.2 Classification and definitions

National class	Definition and Explanation
Primary Forest (Hutan Primer)	Explanation: Forest with no ocular evidence of disturbance
Secondary Forest (Hutan Sekunder)	Explanation: Forest with ocular evidence of disturbance

Planted Forest (Hutan Tanaman)	Explanation: Manmade forest within legal Forest boundaries
Not forested forest land (Non Hutan)	Explanation: Not forested area in lands designated for forest land use
Permanent Forest Area (Kawasan Hutan Tetap)	Explanation: Land with permanent designation of forest land use
Convertible Forest Area (Hutan Produksi Konversi)	Explanation: Forest land which can be used for other purposes
Non-Forest land (Areal Penggunaan Lain -APL)	Explanation: Land not designated for forest land use
Forest	Explanation: Includes primary, secondary and planted forests Forest and non forest are identified or mapped from Landsat imagery using visual interpretation. Since it is difficult to differentiate canopy cover in Landsat imageries, therefore, the forest is identified based on standard interpretation procedure in remote sensing such as tone or texture. During the mapping the minimum area interpreted is 0.5 cm x 0,5 cm. In addition when aerial photograph is used then the minimum canopy cover tp classify as forest is 10% (for co-dominant and dominant trees).
Cloud Cover	Explanation: Clouded area in Satellite imagery

1.2.3 Original data

A. 1990 Data

The 1990 data source are Statistik Sumber Daya Hutan for Indonesia except Java Island and Forestry Statistic 2000 for Java Island. The statistik sumber daya hutan is a national forest inventory report published in 1996 however this report did not cover Java island. Forest cover is derived from Landsat MSS image interpretation using data 1986 – 1992 but mostly 1989. Hence it is assumed that the 1990 condition would not much different from the data in this report. Forest and Non Forest data for Java Island is taken from Forestry Planning Agency Statistic 2000 which originally taken from RePPProT data.

National Categories	1990 Data (in 1000 ha)		
	Outside Java	Java	Indonesia
Forestland			
Forested	112,800	2,925	115,725
Not Forested	31,700		31,700
Non Forestland			-
Forested	7,800		7,800
Not Forested	23,600	10,323	33,923
Total	175,900	13,248	189,148

B. 2000 Data

The 2000 data is taken from Indonesia Land Cover Recalculation 2003 report. Data was derived from Landsat Imagery interpretation taken in 1999/2000

National Categories	2000 Data (in 1000 ha)	
	Original data	After proportionate Cloud Cover Allocation
Forestland		
Forested	83,892	96,409
Not Forested	31,952	36,720
Cloud cover	17,284	
Non Forestland		
Forested	8,066	8,917
Not Forested	41,374	45,739
Cloud cover	5,216	
Total	187,784	187,784

In the above tables, forested area in the non foresland include forested area in non forestland (Forest belong to Areal Penggunaan Lain/ APL) and People Forests. Rubber plantation and oilpalm plantations are excluded from forest categories.

1.3 Analysis and processing of national data

1.3.1 Calibration

The objective of calibration in this table is to meet the FAO requirement that the total land area and the county area in FRA 2005 should be consistent with the FAOSTAT figures. The calibration is merely for FRA 2005 reporting purpose and does not reflect the official total country area of Indonesia. The FAO statistics for Indonesia (in 1000 ha) is as follows:

- Total Land area   181,157
- Inland water bodies   9,300
- Total Country area   190,457

The calibration has been carried out separately for inland water bodies and total country area.

a. Calibration for inland water bodies:

National Categories	Data (in 1000 ha)	
	1990	2000
Forestland		
Forested	115,725	96,409
Not Forested	27,208	32,578
Non Forestland		
Forested	7,800	8,917
Not Forested	29,115	40,580
Inland water bodies	9,300	9,300
Total	189,148	187,784

(Note: Calibration factor for Inland water bodies 1990 = 0.858281395 and
Calibration factor for Inland water bodies 2000 = 0.887215831)

b. Calibration for total country area

National Categories	Data (in 1000 ha)	
	1990	**2000**
Forestland		
Forested	116,567	97,852
Not Forested	27,406	33,066
Non Forestland		
Forested	7,857	9,051
Not Forested	29,327	41,188
Inland water bodies	9,300	9,300
Total	**190,457**	**190,457**

(Note: Calibration factor for total country area 1990 = 1.007278368 and
Calibration factor for total country area 2000 = 1.014974331)

1.3.2 Estimation and forecasting.

The estimation is needed either for 1990 or for 2000 data but forecasting is needed to generate 2005 data. Forecasting is carried out by using this formula:

2005 data = 2000 data +[(2000 data-1990data)/10]*5

The result of forecasting is presented in the following table :

FRA 2005 categories	Area (1000 ha)
	Year 2005
Forest	88,495
Other wooded land	
Other land	92,662
Other land with trees	9,648
Inland water bodies	9,300
Total	190,457

1.4 Reclassification into FRA 2005 classes

The following table shows the percentage of national classes included into FRA2005 categories.

National Class	Percentage allocation to FRA 2005 Categories			
	Forest	**Other wooded land**	**Other land**	**Other land with trees**
Forestland				
Forested	100			
Not Forested			100	
Non Forestland				
Forested				100
Not Forested			100	

Reclassified data to FRA 2005 categories :

FRA 2005 categories	Area (1000 ha)	
	1990	**2000**
Forest	116,567	97,852
Other wooded land		
Other Land	64,590	83,305
Other land with tree cover	7,857	9,051
Inland water bodies	9,300	9,300
Total	190,457	190,457

1.5 Data for National reporting table T1

FRA 2005 Categories	Area (1000 hectares)		
	1990	**2000**	**2005**
Forest	116,567	97,852	88,495
Other wooded land			
Other land	64,590	83,305	92,662
Other land with tree cover	7,857	9,051	9,648
Inland water bodies	9,300	9,300	9,300
TOTAL	190,457	190,457	190,457

1.6 Comments to National reporting table T1

(1) Classification of forest and non forest in this report is derived from Landsat ETM image interpretation. Due to the limitation of ground resolution of Landsat ETM image, any forest with area less then the resolution of this image will be ignored.

(2) Forest and non forest are identified or mapped from Landsat imagery using visual interpretation. On the landsat imageries is difficult to differentiate canopy cover. So that the forest is identified based on standard interpretation procedure in remote sensing such as tone or texture. During the mapping the minimum area interpretated is 0.5 cm x 0.5 cm. In addition when we used aerial photograph the minimum canope cover classified as forest is 10% (for co-dominant and dominant trees).

(3) All non forested areas are classified as "Other land". Shrub and bushes which may still have small trees will belong to "Other land".

(4) Rubber and oil palm plantations are categorized as "Other land" since they are belong to estate.

(5) Forested area outside of forestland (Forested area in APL) and people forest are classified as "Other land with trees".

(6) Increasing area Under land with trees may be caused by the following reasons:
   o The effect of calibration caused by cloud cover area and land area
   o Incomplete data for forest cover are in java for 1990. All area outside of forest land in Java for 1990 data has been classified as "non forest" this might cause underestimating "other land with trees" in 1990 data

    o Non forestland is not permanently designated for forest purposes, therefore, areas under trees on such lands have been classified as "otherland with tree cover".

    o Increasing area of people forest in Java

(7) The agency for forestry planning is still interpreting Landsat images taken in 2003. These 2003 data interpretation will be accomplished at the end of 2004. The data will later on be used to update the 2005 data.

2 Table T2 – Ownership of Forest and Other wooded land

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 Data sources

The Ministry of Forestry publishes Forestry Statistic Book Yearly. The book consists of forestry data and any information related to forestry sector in Indonesia. Following statistic books have been used to derive figures for the country report.

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s) Data	Additional comments
GOI. 1991, Forestry Statistic Book, Ministry of Forestry	H	Extent	1990/1991	Based on Forest Land Use by Consesus map and Community Forest area
GOI. 2002. Forestry Statistic Book, Ministry of Forestry	H	Extent	2002	Based on Forest Land Use by Consesus map and Community Forest area
DG of Land Rehabilitation and Social Forestry Data, Ministry of Forestry	H	Extent	1990 - 2004	

2.2.2 Classification and definitions

National class	Definition
People forest	People owned forest located outside forestland with minimum area is 0.25 ha. This forest is classified as other land with trees and will not be included in table 2..
Public forest	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

2.2.3 Original data

In Indonesia all forest land is owned by government. Some people grow forest in their own land, called as people forest (hutan rakyat). In this report people forest is categorized as other land with trees. The original data will then same as the national data for Table 1.

FRA 2005 Categories	Area (1000 hectares)		
	1990	**2000**	**2005**
Forest	116,567	97,852	88,495
Other wooded land			
Other land	64590	83305	92662
Other land with tree cover	7,857	9,051	9,648
Inland water bodies	9,300	9,300	9,300
TOTAL	190,457	190,457	190,457

2.3 Analysis and processing of national data

2.3.1 Calibration

No calibration is needed for this table.

2.3.2 Estimation and forecasting

No estimation and forecasting is needed for this table.

2.4 Reclassification into FRA 2005 classes

National Categories	FRA 2005 Categories		
	Private ownership	Public ownership	Other ownership
Forest		100	

2.5 Data for National reporting table T2

FRA 2005 Categories	Area (1000 hectares)			
	Forest		**Other wooded land**	
	1990	**2000**	**1990**	**2000**
Private ownership.	0	0	n.a.	n.a.
Public ownership	116,567	97,852	n.a.	n.a.
Other ownership	0	0	n.a.	n.a.
TOTAL	116,567	97,852		

(Note: n.a. = Not Available.)

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)	Additional comments
GOI. 2000 RePProT data (Forestry Planning Agency Statistic Baplan 2000) for 1990 data for Java (In Indonesian language)	H	Extent	1985	Based on various remote sensing data interpretation
GOI. 1996. Final report on Indoensia Forest Resource (In Indonesian Language)	H	Extent	1986 – 1991 mostly 1989	Based on Landsat MSS interpretation data
GOI. 2000. Forestry Statistic book, Ministry of Forestry (In Indonesia Language)	H	Extent	2000	Based on Landsat Imagery interpretation.
GOI, 2003. Indonesia Land Cover Recalculation 2003. (In Indonesian Language) Agency of Forestry Planning. Center for Forestry Mapping. Ministry of Forestry, Indonesia.	H	Extent	2000	Above data in more detail

3.2.2 Classification and definitions

National class	Definition
Production Forest (HP)	Forestland designated for production purposes
Limited production forest (HPT)	Forestland designated for limited production purposes due to the topographic and soil condition
Convertible production forest (HPK)	Forestland designated for production purposes and reserved for non forestry purposes development. Forest type is mostly dry land forest.
Total production forest (HP+HPT+HPK)	Explanation : Sum of HP, HPT and HPK
Protection forest (HL)	Forestland designated for protecting soil and hydrology.
Conservation forest (HK)	Forestland designated for conservation purposes. In this class include national park, nature reserved, wildlife reserved, other protected areas.
Non Forest land (APL)	Land outside forestland which designated for non forestry purposes. Though this is not a forestland, forests occur on this land.

3.2.3 Original data

A. 1990 data

Same as in Table 1. The 1990 data for Table 3 was taken from two sources namely Final report on Indonesia Forest Resource, 1996 and Forest Planning Agency Statistic, 2000. The first report used for outside java data whereas the second report used for Java data.

National Class	Forest (1000ha)		
	Outside Java	**Java**	**Indonesia**
Production forest (HP)	72,900	1,865	74,766
Protection forest (HL)	24,900	632	25,532
Conservation forest (HK)	15,000	427	15,427
Total	112,800	2,925	115,725

B. 2000 data

The 2000 data was taken from Indonesia Land Cover Recalculation 2003 report. Data was derived from Landsat Imagery interpretation taken in 1999/2000. Forest cover data was overlaid on forest landuse planning data so that the forest cover for each designated function can be generated.

National Class	2000 data (in 1000ha)		
	Forested	**Not Forested**	**Cloud cover**
Production forest (HP)	50,114	24,337	9,246
Protection forest (HL)	20,853	4,748	4,359
Conservation forest (HK)	12,926	2,867	3,678
Total	83,892	31,952	17,284

As in Table 1, cloud cover was extrapolated to forested and not forested area leading to following table.

National Class	2000 extrapolated data (in 1000ha)	
	Forested	Not Forested
Production forest (HP)	56,069	27,628
Protection forest (HL)	24,404	5,557
Conservation forest (HK)	15,936	3,535
Total	96,409	36,720

3.3 Analysis and processing of national data

3.3.1 Calibration

Calibration has been conducted for both 1990 and 2000 data.

National Class	Forest (1000ha)	
	1990	2000
Production forest (HP)	75,310	56,908
Protection forest (HL)	25,718	24,769
Conservation forest (HK)	15,539	16,175
Total	116,567	97,852

Note :
- Calibration factor for 1990 data is 1.007278368
- Calibration factor for 2000 data is 1.01496782

3.3.2 Estimation and forecasting

No estimation is needed for 1990 and 2000 figures, however forecasting is required to predict the extent of forest based on the designated forest function in 2005. Forecasting has been done using linear extrapolation method.

National Class	Forest (1000ha)
	2005
Production forest (HP)	47,707
Protection forest (HL)	24,295
Conservation forest (HK)	16,494
Total	88,495

3.4 Reclassification into FRA 2005 classes

National Class	FRA 2005 Categories					
	Production	Protection for soil and water	Conservation of biodiversity	Social services	Multiple purposes	No or unknown function
Production forest (HP)	100					
Protection forest (HL)		100				
Conservation forest (HK)			100			
Non Forestland						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	75,310	56,908	47,707	75,310	56,908	47,707
Protection of soil and water	25,718	24,769	24,295	41,257	40,944	40,788
Conservation of biodiversity	15,539	16,175	16,493	41,257	40,944	40,788
Social services						
Multiple purpose				n. ap.	n. ap.	n. ap.
No or unknown function						
Total- Forest	116,567	97,852	88,495	n. ap.	n. ap.	n. ap.
Other wooded land						
Production						
Protection of soil and water						
Conservation of biodiversity						
Social services						
Multiple purpose				n. ap.	n. ap.	n. ap.
No or unknown function				n. ap.	n. ap.	n. ap.
Total – Other wooded land				n. ap.	n. ap.	n. ap.

Note : It is assumed that forest areas with protection of soil and water function also have secondary function for conservation of biodiversity and vice versa for that reason the total area with function for those categories are the sum of the forest area of those two functions.

3.6 Comments to National reporting table T3

The extent of forest for conservation purposes in 2000 is larger than the extent of forest in 1990. This may be due to the establishment of several new national park during the last decade.

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)	Additional comments
GOI. 2000 RePProT data (Forestry Planning Agency Statistic Baplan 2000) for 1990 data for Java (In Indonesian language)	H	Extent	1985	Based on various remote sensing data interpretation
GOI. 1996. Final report on Indoensia Forest Resource (In Indonesian Language)	H	Extent	1986 – 1991 mostly 1989	Based on Landsat MSS interpretation data
GOI. 2000. Forestry Statistic book, Ministry of Forestry (In Indonesia Language)	H	Extent	2000	Based on Landsat Imagery interpretation.
GOI, 2003. Indonesia Land Cover Recalculation 2003. (In Indonesian Language) Agency of Forestry Planning. Center for Forestry Mapping. Ministry of Forestry, Indonesia.	H	Extent	2000	Above data in more detail

4.2.2 Classification and definitions

National class	Definition
Primary Forest (Hutan Primer)	Explanation: Forest with no ocular evidence of disturbance. This is indicated by the occurrence of logging roads.
Secondary Forest (Hutan Sekunder)	Explanation: Forest with ocular evidence of disturbance
Planted Forest (Hutan Tanaman)	Explanation: Man made forest within legal Forest boundaries

4.2.3 Original data

a. 1990 data

National class	Forest area (1000 ha)
Primary forest	61,109
Secondary forest	38,130
Planted forest	1,917
Total	101,156

b. 2000 data

National class	Forest area (1000 ha)	
	Original	Cloud cover adjusted
Primary forest	47,960	55,116
Secondary forest	33,358	38,335
Planted forest	2,574	2,958
Total	83,892	96,409

Note: 1. Cloud cover = 17,284,000 ha and Not forested = 31,952,000 ha

2. The primary forests are defined by ocular identification since the interpretation of forest mapping is done visually. The area of different categories has been estimated on the map or using GIS.

4.3 Analysis and processing of national data

4.3.1 Calibration

The original data in table 1 and table 4 for year 1990 comes from same source (Final Report on Indonesia Forest Resource -NFI Field document No 55). However the approach to calculate the area is different. The forest area in Table 1 are from remote sensing imageries while the area in Table 4 derived from estimation using TSP/PSP measurement on the field. In addition the original data in Table 4 does not cover the whole area covered in Table 1, therefore it has been calibrated to match the forest area in Table 1 for 1990 and 2000.

National Class	Forest (1000ha)	
	1990	**2000**
Primary forest	70,419	55,941
Secondary forest	43,939	38,909
Planted forest	2,209	3,002
Total	116,567	97,852

(Note : Calibration factor for 1990 data is 1.15234885 and Calibration factor for 2000 data is 1.014974331)

4.3.2 Estimation and forecasting

Only forecasting has been carried out to get 2005 data using same formulas as used in table 1.

National class	Forest area in 2005 (1000 ha)
Primary forest	48,702
Secondary forest	36,394
Planted forest	3,399
Total	88,495

4.4 Reclassification into FRA 2005 classes

National Class	FRA 2005 categories				
	Primary	**Modified Natural**	**Semi natural**	**Productive plantation**	**Protective plantation**
Primary forest	100				
Secondery forest			100		
Planted forest (Perhutani)				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	70,419	55,941	48,702	NA	NA	NA
Modified natural				NA	NA	NA
Semi-natural	43,939	38,909	36,394	NA	NA	NA
Productive plantation	2,209	3,002	3,399	NA	NA	NA
Protective plantation				NA	NA	NA
TOTAL	116,567	97,852	88,492	NA	NA	NA

4.6 Comments to National reporting table T4

(1) It is difficult to differentiate between semi natural and modified natural. Practically we used combination between natural and man made regeneration or plantation
Protective plantation is not available as the reforestation program has been carried out in the semi-natural forest, therefore data for protective plantation are incorporated into that forest category.

(2) The original data in table 1 and table 4 for year 1990 come from same reference which is Final Report on Indonesia Forest Resource (NFI Field document No 55). However the approach to calculate the area is different. The forest area in Table 1 are from remote sensing imageries while the area in Table 4 derived from estimation using TSP/PSP measurement on the field. In addition the original data in Table 4 does not cover the whole area such as in Table 1. For that reason calibration of the original data in Table 4 to the forest area in Table 1 has been done in section 4.3.1.

5 Table T5 – Growing stock

5.1 FRA 2005 Categories and definitions

Category	Definition
Growing stock	Volume over bark of all living trees more than 20 cm in diameter at breast height (or above buttress 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 50 cm or more

5.2 National data

5.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
GOI. 1994. National forest inventory. Forest Resource statistic.	H	Volume	1990 - 1994	Reference year becomes 1992
GOI. 2000. Reenumeration data	H	Volume	1996 - 2000	Data is the result of re-enumeration data processing. Reference year become 1998.
GOI. 2000. Perum Perhutani	H	Volume	2000	Based on calculation done by Perum Perhutani

5.2.2 Classification and definitions

National class	Definition
Volume for all species (Volume seluruh jenis)	Volume of all species with diameter of 20 cm or more at breast height or 20 cm above buttress.
Volume for comercial species (Volume jenis-jenis niagawi)	Volume of all comercial species with diameter of 50 cm or more at breast height or 20 cm above buttress.
Plantation Forest Perum Perhutani	Explanation : Standing stock estimated from various species planted by Perum Perhutani (from Age class I to mature class)

(Note: The classification of commercial species is based on the commercial species list developed by Forest Research and Development Agency).

5.2.3 Original data

A. Natural Forest

The first original data were taken from Forest Resource statistic representing the result of enumeration from National Forest Inventory activities. The enumeration was carried out from 1990 – 1994 and therefore the data is referred as 1992 data. The second original data were taken from the result of re-enumeration data processing. The re-enumeration was carried out from 1996 – 2000 and the data is, therefore, referred as 1998 data.

National Class	Forest	
	Volume (million m3)	
	1992	1998
Volume for all species	12,345.4	9,054,8
Volume for comercial species	2,914.9	816.2

B. Plantation Forest Perum Perhutani.

Standing stock for 1990 is not available. The standing stock for 2000 is estimated from various species planted by PerumPerhutani (from Age class I to mature class). The estimation was carried out by Perum Perhutani. The standing stock for Forest plantation from outside Perum Perhutani is not available.

Species	Growing stock (m3)
Teak	28,617,448
Pine	31,592,521
Mahagony	836,042
Others	2,641,341
Total	63,687,352

5.3 Analysis and processing of national data

5.3.1 Calibration

There is no need for calibration for processing the national data.

5.3.2 Estimation and forecasting

Estimation is carried out for Natural forest only.
Since the reference year for original data are 1992 and 1998, so that estimation is needed to calculate 1990 and 2000 data. Estimation is calculated using the following formula :

-   1990 data = 1992 + (((1992 – 1998)/6)*2)
-   2000 data = 1998 – (((1992 – 1998)/6)*2)

National Class	Forest	
	Volume (million m3)	
	1990	2000
Volume for all species	13,442	7,958
Volume for comercial species	3,614	117

To calculate 2005 data, forecasting the following formula has been applied.
-   2005 data = 1998+((1998-1992)/6)*7

National Class	Forest
	Volume (million m3)
	2005
Volume for all species	5,216
Volume for comercial species	NA

5.4 Reclassification into FRA 2005 classes

National Class	FRA 2005 Categories	
	Growing Stock	Commercial growing stock
Volume for all species (Seluruh Jenis)	100	
Volume for commercial species (Jenis-jenis niagawi)		100
Plantation Perum Perhutani		100

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	13,442	8022	5,216	NA	NA	NA
Commercial growing stock	3,614	181	NA	NA	NA	NA

(Note: The growing stock for 2000 includes 64 million cubic meters of growing stock of plantations)

Additional Information

Specification of country threshold values	Unit	Value	Complementary information
1. Minimum diameter at breast height of trees included in Growing stock (X) cm	cm	20	This threshold is only for natural forest.
2. Minimum diameter at the top end of stem (Y) for calculation of Growing stock cm	na		Top end of stem is the position of the first branch
3. Minimum diameter of branches included in Growing stock (W) cm	na		Branches are not included in the growing stock calculation
4. Minimum diameter at breast height of trees in Commercial growing stock (Z) cm	cm	50	This threshold is only for natural forest.
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

- The growing stock for 1990 data is from natural forest only since the growing stock from plantation forest was not available.
- The growing stock for 2000 data are from natural forest and from plantation forest of Perum Perhutani only.
- Growing stock presented in this figure may be lower than the actual growing stock due to the absence of growing stock from plantation forests.

6 Table T6 – Biomass stock

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 Data sources

References to sources of Information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
GOI. 1994. National forest inventory. Forest Resource statistic.	H	Volume	1990 - 1994	Reference year 1992
GOI. 2000. Reenumeration data.	H	Volume	1996 - 2000	Reference year 1998.
GOI. 2000. Perum Perhutani	H	Volume	2000	Calculation by Perum Perhutani

6.2.2 Classification and definitions

There is no specific national definition for biomass stock hence FRA 2005 FRA 2005 definitions have been used.

6.2.3 Original data

A. Natural Forest :

The original data for biomass stock is from re-enumeration for NFI's PSP data. Following is growing stock by 10 most dominance species and others. The reference year is 1998.

No.	Local Name (Botanical name)	Growing stock (mill. M3)
1	Meranti (Shorea sp)	1,165.3
2	Medang (Beilschmiedia sp)	332.7
3	Keruing (Dipterocarpus sp)	316.2
4	Kelat (Eugenia sp)	118.7
5	Bintangur (Terminalia sp)	98.8
6	Nyatoh (Palaquium sp)	116.1
7	Jambu-jambu (Dysoxyllum sp)	71.9
8	Ubah (Eugenia sp)	81.4
9	Resak (Shorea sp)	71.9
10	Balam (Palaquium sp)	73.6
11	Others	6,608.2
	Total	**9,054.8**

B. Plantation Forest (Perum Perhutani)

Species	Growing stock (mill m3)
Teak	28.62
Pine	31.59
Mahagony	0.84
Others	2.64
Total	63.69

6.3 Analysis and processing of national data

6.3.1 Calibration

Calibration is not needed.

6.3.2 Estimation and forecasting

Species-wise breakdown for 2000 is based on intra-species proportion of 1998.

No.	Local Name (Botanical name)	Species –wise Growing stock in 2000 (mill. M3)
1	Meranti (Shorea sp)	1,024.10
2	Medang (Beilschmiedia sp)	292.38
3	Keruing (Dipterocarpus sp)	277.92
4	Kelat (Eugenia sp)	104.31
5	Bintangur (Terminalia sp)	86.80
6	Nyatoh (Palaquium sp)	102.03
7	Jambu-jambu (Dysoxyllum sp)	63.20
8	Ubah (Eugenia sp)	71.57
9	Resak (Shorea sp)	63.20
10	Balam (Palaquium sp)	64.72
11	Others	5,807.69
	Total	7,957.92

A. Natural Forest.

Biomass expamsion factor (BEF) was calculated using the following formula.
BEF = Exp{3.213-0.506*LN(BM)} (Brown, Sandra 1997. Estimating biomass change in tropical forests. A primier. FAO Forestry Paper No. 134.).

Variables	unit	1990	2000	2005
Growing stock (Table 5)	million tonnes	13442	7958	5216
Weighted wood density		0.5	0.5	0.5
Stem biomass	million tonnes	6721	4011	2608
Natural Forest Area (forest less planted)	million ha	114.358	94.85	85.096
Biomass per ha	tonnes/ha	58.77	42.29	30.65
BEF		3.4	3.4	3.4
Above Ground Biomass (Natural Forests)		22851	13637	8867
Below Ground Biomass (Natural Forests)	Root:Shoot ratio 0.33	7541	4500	2926
Total Live Biomass (Natural Forests)		30392	18138	11793
Deadwood Biomass (Natural Forests)	Dead:Live	3343	1995	1297

B. Plantation Forest (Perum Perhutani).

Calculating weighted Density (for 2000)

Species	Growing stock million m^3	Wood Density	Stem Biomass	Weighted Density	Stem Biomass Per ha. (2000)
Teak	28.62	0.55	15.741		
Pine	31.59	0.54	17.0586		
Mahagony	0.84	0.53	0.4452		
Others	2.64	0.50	1.32		
Total	63.69		34.5648	0.542703721	11.68519

Calculating weighted BEF

	Teak	Pine	Mahogany	Others	Total
Growing stock	28.62	31.59	0.84	2.64	63.69
BEF	1.4	1.3	1.4	1.4	
Above ground biomass	40.068	41.067	1.176	3.696	86.007
Weighted BEF					1.3504

Calculating Biomass

Variables		1990	2000	2005
Planted Forest - Area Table 4	Million ha	2.209	3.002	3.399
Stem Biomass/ha	tonnes/ha	-	11.6852	-
Total Stem biomass	million tonnes	-	35.08	-
BEF		-	1.35	-
Above Ground Biomass (Planted Forests)	million tonnes	-	47.36	
Below Ground Biomass (Planted Forests)	million tonnes	-	15.63	-
Total Live biomass	million tonnes	-	62.98	-
Dead Wood Biomass (planted Forests)	million tonnes	-	6.93	-

Biomass stock from plantation forest is not calculated since the data available is only for year 2000 (Perum Perhutani) and data from plantation forest other than Perum Perhutani is not available for year 1990 and 2000.

6.4 Reclassification into FRA 2005 classes

Reclassification is not needed.

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	22851	13685	8867	NA	NA	NA
Below-ground biomass	7541	4516	2926	NA	NA	NA
Dead wood biomass	3343	2002	1297	NA	NA	NA
TOTAL	33736	20203	13091			

6.6 Comments to National reporting table T6

Biomass stock for year 1990 and 2005 are calculated for natural forest only due to the unavailability of plantation forest growing stock data for 1990 and 2005.

7 Table T7 – Carbon stock

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)	Additional comments
GOI. 1994. National forest inventory. Forest Resource statistic.	H	Volume	1990 - 1994	Reference year 1992
GOI. 2000. Reenumeration data.	H	Volume	1996 - 2000	Reference year 1998.
GOI. 2000. Perum Perhutani	H	Volume	2000	Calculation by Perum Perhutani

7.2.2 Classification and definitions

There is no specific national definition for carbon stock hence FRA 2005 FRA 2005 definitions have been used.

7.2.3 Original data

The original data for carbon stock is biomass stock taken from Table 6.

FRA 2005 Categories	Biomass (million metric tonnes oven-dry weight)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Above-ground biomass	22851	13685	8867	NA	NA	NA
Below-ground biomass	7541	4516	2926	NA	NA	NA
Dead wood biomass	3343	2002	1297	NA	NA	NA
TOTAL	33736	20203	13091			

7.3 Analysis and processing of national data

7.3.1 Calibration

No calibration is needed for Table 7.

7.3.2 Estimation and forecasting

Assuming default value of 2.1 tones/ha for natural forests and 1 tones per ha for plantations

Variables		1990	2000	2005
Area of Natural forests	million ha	114.36	94.85	85.096
GPG default factor	tonnes/ha	2.1	2.1	2.1
Carbon in litter	million tonnes	240	199	179
Area of Planted Forests	million ha	2.209	3.002	3.399
GPG default factor	tonnes/ha	1	1	1
Carbon in litter	million tonnes	-	3.00	-
Total Carbon in litter		240	202	179

7.4 Reclassification into FRA 2005 classes

Reclassification is not needed.

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	11426	6842	4434			
Carbon in below-ground biomass	3770	2258	1463			
Sub-total: Carbon in living biomass	**15196**	**9100**	**5897**			
Carbon in dead wood	1672	1001	649			
Carbon in litter	240	202	179			
Sub-total: Carbon in dead wood and litter	**1912**	**1203**	**1014**			
Soil carbon to a depth of _____ cm						
TOTAL CARBON	**17108**	**10303**	**6911**			

7.6 Comments to National reporting table T7

Same as biomass stock, carbon stock for year 1990 and 2005 are calculated for natural forest only.

8 Table T8 – Disturbances affecting health and vitality

8.1 FRA 2005 Categories and definitions

Category	Definition
Disturbance by fire	Disturbance caused by wildfire. independently whether it broke out inside or outside the forest/OWL.
Disturbance by insects	Disturbance caused by insect pests that are detrimental to tree health.
Disturbance by diseases	Disturbance caused by diseases attributable to pathogens. such as a bacteria. fungi. phytoplasma or virus.
Other disturbance	Disturbance caused by other factors than fire. insects or diseases.

8.2 National data

8.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
GOI. 2003. DG of Forest Protection and Nature Conservation Statistic	H/M	Extent	1998 - 2003	
GOI. 1989. Forestry statistic 1988/1989	H/M	Extent	1988	
GOI. 1990. Forestry statistic 1989/1990	H/M	Extent	1989	
GOI. 1991. Forestry statistic 1990/1991	H/M	Extent	1990	
GOI. 1992. Forestry statistic 1991/1992	H/M	Extent	19991	
GOI. 1993. Forestry statistic 1992/1993	H/M	Extent	1992	

8.2.2 Classification and definitions

National class	Definition
Kebakaran hutan (Forest Fires)	Wildfire in the forestland
Hama dan penyakit (Insect and disease)	Forest disturbance due to insect or disease

8.2.3 Original data

A. 1990 data

National Class	Extent (Ha)				
	1988	**1989**	**1990**	**1991**	**1992**
Kebakaran Hutan (Forest Fire)	7,769	20	34,241	118,462	14,286
Hama dan Penyakit (Insect and diseases)	1,230	11,883	0	490	0

b. 2000 data

National Class	Extent (Ha)				
	1998	1999	2000	2001	2002
Kebakaran Hutan (Forest Fire)	515,026	44,090	3,017	14,330	35,497
Hama dan Penyakit (Insect and diseases)	0	0	0	0	0

8.3 Analysis and processing of national data

8.3.1 Estimation and forecasting

Estimation is needed to calculate the 1990 and 2000 data which are the average value of five year data.

National Class	Average extent (1000 Ha)	
	1990	**2000**
Kebakaran Hutan (Forest Fire)	34,95	122,39
Hama dan Penyakit (Insect and diseases)	2,71	NO

(NO = No occurrence of disturbance by insect and disease.)

8.4 Reclassification into FRA 2005 classes

In Indonesia, *Hama dan penyakit* which actually caused by either insect or disease is usually presented together. There is lack information on the impact of insect and disease to the forest area in the country.

National Class	FRA 2005 categories			
	Disturbance by Fire	**Disturbance by Insect**	**Disturbance by disease**	**Other disturbance**
Kebakaran hutan (Forest fire)	100			
Hama dan Penyakit (Insect and disease)		100		

8.5 Data for National reporting table T8

FRA-2005 Categories	Avegare annual area affected (1000 hectares)			
	Forests		**Other wooded land**	
	1990	**2000**	**1990**	**2000**
Disturbance by fire	34.95	122.39	NA	NA
Disturbance by insects	2.71	NO	NA	NA
Disturbance by diseases	NO	NO	NA	NA
Other disturbance	NO	NO	NA	NA

(NO = No occurrence of disturbance by insect and disease.)

8.6 Comments to National reporting table T8

The disturbances reported in this table were disturbances which occurred in the forestland.

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)	Additional comments
Directorate General of Forest Protection and Nature Conservation (PHKA)	H	Species	2000	Based on IUCN Red List of Threatened species

9.2.2 Classification and definitions

National class	Definition/ Explanation
Kritis	Explanation : Critically Endangered species
Genting	Explanation : Endangered species
Rentan	Explanation :Vulnerable species

9.2.3 Original data

STATUS	Number of species IUCN*
Kritis (Critically Endangered-CR)	122
Genting (Endangered-EN)	57
Rentan (Vulnerable-VU)	76

(Source: List of Species status from Directorate General of Forest Protection and Nature Conservation (PHKA) which is based on IUCN Red List of Threatened species.)

9.3 Analysis and processing of national data

This step is not needed.

9.4 Reclassification into FRA 2005 classes

This step is not needed.

9.5 Data for National reporting table T9

FRA 2005 Categories	Number of species (year 2000)
Native tree species	ID
Critically endangered tree species	122
Endangered tree species	57
Vulnerable tree species	76

9.6 Comments to National reporting table T9

The number of native Dipteocarp species is approximately 600 (personal communication with one of Director in Forestry R&D Agency). However, complete information on this subject is not available.

10 Table T10 – Growing stock composition

10.1 FRA 2005 Categories and definitions

List of species names (scientific and common names) of the ten most common species.

10.2 National data

10.2.1 Data sources

References to sources of Information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
GOI. 1994. National forest inventory. Forest Resource statistic.	H	Volume	1990 - 1994	Reference year 1992
GOI. 2000. Reenumeration data.	H	Volume	1996 - 2000	Reference year 1998.
GOI. 2000. Perum Perhutani	H	Volume	2000	Calculation by Perum Perhutani

10.2.2 Original data

A. Natural Forest :

The original data for this table is same as in Table 6 which are from the result of reenumeration for NFI's PSP data. There are10 most dominance species and others. The reference year is 1998.

No.	Local Name (Botanical name)	Growing stock (mill. M3)
1	Meranti (Shorea sp)	1.165,3
2	Medang (Beilschmiedia sp)	332,7
3	Keruing (Dipterocarpus sp)	316,2
4	Kelat (Eugenia sp)	118,7
5	Bintangur (Terminalia sp)	98,8
6	Nyatoh (Palaquium sp)	116,1
7	Jambu-jambu (Dysoxyllum sp)	71,9
8	Ubah (Eugenia sp)	81,4
9	Resak (Shorea sp)	71,9
10	Balam (Palaquium sp)	73,6
11	Others	6.608,2
	Total	9.054,8

B. Plantation Forest (Perum Perhutani)

No.	Species	Growing stock (mill m3)
1	Teak	28.62
2	Pine	31.59
3	Mahagony	0.84
4	Others	2.64
	Total	63.69

10.3 Analysis and processing of national data

10.3.1 Calibration

No Calibration is needed for Table 10.

10.3.2 Estimation and forecasting

The following table presents the species-wise growing stock figures for 2000 from Table 5 after adding growing stock for plantation forest (Perum Perhutani) to the last row (remainder of species).

No.	Local Name (Botanical name)	Growing stock (mill. M3)
1	Meranti (Shorea sp)	1,024.10
2	Medang (Beilschmiedia sp)	292.38
3	Keruing (Dipterocarpus sp)	277.92
4	Kelat (Eugenia sp)	104.31
5	Bintangur (Terminalia sp)	86.80
6	Nyatoh (Palaquium sp)	102.03
7	Jambu-jambu (Dysoxyllum sp)	63.20
8	Ubah (Eugenia sp)	71.57
9	Resak (Shorea sp)	63.20
10	Balam (Palaquium sp)	64.72
11	Remainder of species	5,871.38
	Total	8,021.61

10.4 Reclassification into FRA 2005 classes

This step is not needed.

10.5 Data for National reporting table T9

Assuming that the relative species composition in 1990 and 2000 was same as in 1998.

FRA 2005 Categories Common name	FRA 2005 Categories Species name	Growing Stock in Forests (million cubic meters)	
		1990	**2000**
Meranti	Shorea spp.	1716	1024
Medang	Beilshiemedia sp.	490	292
Keruing	Dipterocarpus sp	466	278
Kelat	Eugenia sp.	175	104
Bintangur	Terminalia sp.	145	87
Nyatoh	Palaquium sp.	171	102
Jambu-Jambu	Dysoxyllum sp	106	63
Ubah	Eugenia sp.	120	72
Resak	Shorea sp.	106	63
Balam	Palaquium sp.	108	65
Rest spp.	Rest of spp.	9839	5871

TOTAL	TOTAL	13,442	8022

10.6 Comments to National reporting table T10

11 Table T11 – Wood removal

11.1 FRA 2005 Categories and definitions

Category	Definition
Industrial wood removal	The wood removed (volume of roundwood over bark) for production of goods and services other than energy production (woodfuel).
Woodfuel 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)	Additional comments
Directorate general of Forest Utilization	M	Volume	1990	
Directorate general of Forest Utilization	M	Volume	2000	
GOI. 1994 Pocket Statistic Book of Perum Perhutani.	H	Volume	1990	Year 1990 - 1994
GOI. 2001 Perum Perhutani Statistic 2001	H	Volume	2000	

11.2.2 Classification and definitions

National class	Definition/Explanation
Hutan alam	Explanation : Natural forest
Hutan Tanaman	Explanation : Plantation forest
Bahan baku Industri	Explanation :Wood for industrial purposes. This is from natural and planted forest.
Kayu baker	Explanation : Fuelwood

11.2.3 Original data

For industrial wood, original data are available for 1990 and 2000 from both natural and plantation forests, however for fuelwood, data are available only from plantation forest (Perum Perhutani). For 2005 data, production are forecasted based on cutting quota defined by Ministry of Forestry.

National Class	Natural Forest (1000m3)			Plantation forest (1000m3)		
	1990	2000	2005	1990	2000	2005
Bahan baku Industri (Industrial roundwood)	24,935	18,039	5,457	1,268	6,199	5,721
Kayu Bakar (Fuel wood)	-	-	-	357	171,3	-
Total	24,935	18,039	5,457	1,625	6,371	5,721

11.3 Analysis and processing of national data

The figures for 2005 were forecasted using linear interpolation.

11.4 Reclassification into FRA 2005 classes

National class	FRA2005 categories	
	Industrial roundwood	**Woodfuel**
Bahan baku Industri (Hutan Alam)- Industrial roundwood from Natural forest	100	
Bahan baku Industri (Hutan Tanaman). Fuelwood from Planted forest.	100	
Kayu bakar		100

11.5 Data for National reporting table T11

Assuming that wood fuel in 2005 is in same proportion to round wood as it was in 2000

FRA 2005 Categories	Volume in 1000 cubic meters of roundwood over bark					
	Forest			Other wooded land		
	1990	**2000**	**2005**	**1990**	**2000**	**2005**
Industrial roundwood	26,203	24,238	11,178	NA	NA	NA
Woodfuel	357	171	79	NA	NA	NA
TOTAL for Country	26,560	24,410	11,257	NA	NA	NA

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

References to sources of Information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Directorate general of Forest Utilization	M	Volume	1990	
Directorate general of Forest Utilization	M	Volume	2000	
GOI. 1994 Pocket Statistic Book of Perum Perhutani.	H	Volume	1990	Year 1990 - 1994
GOI. 2001 Perum Perhutani Statistic 2001	H	Volume	2000	

12.2.2 Classification and definitions

National class	Definition/ Explanation
Hutan alam	Explanation : Natural forest
Hutan Tanaman	Explanation : Planted forest
Bahan baku Industri	Explanation : Wood for industrial purposes. These are from natural and planted forest.
Kayu bakar	Explanation : Fuelwood

12.2.3 Original data

National Class	Natural forest (1000USD)			Plantation Forest (1000USD)		
	1990	2000	2005	1990	2000	2005
Bahan baku Industri	NA	2,302,876	NA	121,645	238,326	NA
Kayu Bakar	NA	NA	NA	1,334	325	NA
Total	NA	2,689,814	NA	122,979	238,651	NA

(Note : Fuelwood data is available from plantation forest only (Perhutani))

12.3 Analysis and processing of national data

12.3.1 Estimation and forecasting

The value of wood removal for 1990 taken from natural forest was acquired using estimation. The estimation has been carried out by assuming that the value of wood removal in 1990 and 2000 are same which is USD 127.659984/m3. The wood removal for 1990 is 24,935,072 m3 so that the estimation for value of wood removal in 1990 is USD 3,183,210,000

National Class	Natural forest (1000USD)			Plantation Forest (1000USD)		
	1990	2000	2005	1990	2000	2005
Bahan baku Industri	3,183,210	2,302,876	NA	121,645	238,326	NA
Kayu Bakar	NA	NA	NA	1,334	325	NA
Total	3,183,210	2,689,814	NA	122,979	238,651	NA

12.4 Reclassification into FRA 2005 classes

National class	FRA2005 categories	
	Industrial roundwood	Woodfuel
Bahan baku Industri (Hutan Alam)	100	
Bahan baku Industri (Hutan Tanaman)	100	
Kayu bakar (Hutan Tanaman)		100

12.5 Data for National reporting table T12

For developing following figures for 2005 it has been assumed that linear trend from 1990 to 2000 will continue in 2005.

FRA 2005 Categories	Value of roundwood removal (1000 USD)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Industrial roundwood	3,304,855	2,541,404	2,159,679	NA	NA	NA
Woodfuel	1,334	325	NA	NA	NA	NA
Total for Country	3,306,189	2,541,729	2,159,679	NA	NA	NA

12.6 Comments to National reporting table T12

- The value of wood removal for 1990 is estimated using assumption that the value of wood removal per m3 in 1990 is same as in 2000.
- The value of wood removal for wood fuel may be lower than the actual one since the woodfuel data available is only from plantation forest managed by Perum Perhutani.

13 Table T13 – Non Wood Forest Products 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

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Directorate General of Forest Utilization	H/M	Mass	1990	
GOI.. 1991. Forestry Statistics of Indonesia 1990/1991	H/M	Mass	1990	
Directorate General of Forest Utilization	H/M	Mass	2000	
GOI. 2000. Forestry Statistics of Indonesia 2000	H/M	Mass	2000	
GOI. 2001. Directorate General of Land Rehabilitation and Social Forestry, 2001	H/M	Mass	2000	Silk and Bee Honey data
Directorate General of Forest Protection and Natural Conservation	H/M	Mass	2000	
GOI. 1999. Natural Silk Development Pattern (in Indonesian), D G of Metal Industry, Electronic Machine and Other, Ministry of Industry.	H/M	Mass	1990	Presented for Silk discussion (17 Feb. 1999)
Faisal. 2004. Sistem pemasaran gaharu dalam dan luar negeri. (Paper prepared by Dr. M Faisal Salampessy, SH.Dipl.int)	H	Mass	2004	For agarwood data

13.2.2 Classification and definitions

National class	Definition/Explanation
Rotan (Rattan)	Explanation : Raw rattan
Gondorukem (Gum resin)	Explanation : Resin tapped from pine trees.
Terpentin(Turpentin)	Explanation : Processed gondorukem (Turpentin)
Sutera (Silk)	Explanation : Raw Silk
Kayu putih (Cajuput oil)	Explanation : Oil extracted from leaf of Melaluca sp.
Gaharu (Agarwood)	Explanation : Agarwood, taken from Aquilaria malaccensis and Aquilaria filaria
Arang (Charcoal)	Explanation : Charcoal

13.2.3 Original data

National Class	Unit	Years			Remarks
		1990	2000	2005	
Rattan	Ton	52,171.00	94,752.00	NA	Forestry Statistics 2000
Gum resin	Ton	38,150.00	51,874.00	NA	DG of FU
Resin	Ton	10,496.00	3,342.00	NA	Forestry Statistics 2000
Turpentin	Ton	2,191.00	9,948.00	NA	DG of FU, Excluded from calculation
Silk	Ton	-	-	NA	Data available but excluded.
Cajuput oil	Ton	167,646.00	NA	NA	
Charcoal		49.613.00	NA	NA	
Agarwood (Gaharu)	Ton	NA	255.00	NA	Data for export only
Bee honey	Ton	NA	1,117.00	NA	Honey from Apies dorsata

Note:
- The bee honey data is honey produced from Apies dorsata which live in the forest. The bee honey from bee farm were excluded.
- There are silks data for 1990 and 2000, however the silks are produced from farm not from the forest that is way the data were excluded. For 1990 and 2000, raw silk production are 140 ton and 71.13 ton respectively.
- The agarwood data available are only the agarwood for export .
- Actually there are data several data for animal product/ raw material which we could not convert to FAO table due to the FAO table require the unit in ton however the data available is in individu or pieces which could not be converted to ton. These data will be presented in the comment to national reporting table sub paragraph.

13.3 Analysis and processing of national data

13.3.1 Estimation and forecasting

No estimation has been made

13.4 Reclassification into FRA 2005 classes

FRA 2005 Categories	National Class								
	Rattan	Gum resin	Resin	Turpentin	Silk	Cajuput oil	Charcoal	Agarwood	Bee Honey
Plant products / raw material									
1. Food									
2. Fodder									
3. Raw material for medicine and aromatic products						100		100	
4. Raw material for colorants and dyes									
5. Raw material for utensils. handicrafts & construction	100								
6. Ornamental plants									
7. Exudates		100	100						
8. Other plant products							100		
Animal products / raw material									
9. Living animals									
10. Hides. skins and trophies									
11. Wild honey and bee-wax									100
12. Bush meat									
13. Raw material for medicine									
14. Raw material for colorants									
15. Other edible animal products									
16. Other non-edible animal products									

13.5 Data for National reporting table T13

FRA 2005 Categories	Scale factor	Unit	NWFP removal		
			1990	2000	2005
Plant products / raw material					
1. Food		Ton			
2. Fodder		Ton			
3. Raw material for medicine and aromatic products		Ton	167,646	255	NA
4. Raw material for colorants and dyes		Ton			NA
5. Raw material for utensils. handicrafts & construction		Ton	52,170	94,752	NA
6. Ornamental plants		Ton			
7. Exudates		Ton	40,646	55,216	
8. Other plant products		Ton	49,613	NA	NA
Animal products / raw material					
9. Living animals	1000	No	629	56	n.a.
10. Hides. skins and trophies	1000	No.	983	133	n.a.
11. Wild honey and bee-wax		Ton	NA	1,117	NA

12. Bush meat		Ton			
13. Raw material for medicine		Ton			
14. Raw material for colorants		Ton			
15. Other edible animal products		Ton			
16. Other non-edible animal products		Ton	-	-	NA

13.6 Comments to National reporting table T13

1. Following data is not included in above tables.

National Class	Scale factor	Unit	Years		
			1990	2000	2005
Butterfies		Individual		6,440	NA
Other insect		Individual		4,337	NA
Mollusca		Individual		310	NA

2. To avoid double counting, turpentine which is processed from gum resin has been excluded from the calculation. The figure for turpentine for year 1990 and 2000 respectively are 2,191 tons and 9,948 tons.

14 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

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Directorate General of Forest Utilization	H/M	Mass	1990	
Directorate General of Forest Utilization	H/M	Mass	2000	
Directorate general of Land Rehabilitation and Social Forestry, 2001	H/M	Mass	2000	Silk and Bee Honey data
Natural Silk Development Pattern (Paper in Indonesian), Directorate general of Metal Industry, Electronic Machine and Other, Ministry of Industry.	H/M	Mass	1990	Presented for Silk Discussion (17 Feb. 1999)
GOI. 1994 Pocket Statistic Book of Perum Perhutani. Year 1990 - 1994	H	Value	1990	
GOI. 2001. Perum Perhutani Statistic 2001	H	Value	2000	
Directorate General of Forest Protection and Natural Conservation	H/M	Value	2000	
Salapessy. 2004. Sistem pemasaran gaharu dalam dan luar negeri.	H	Value	2004	For agarwood data

14.2.2 Classification and definitions

National class	Definition/Explanation
Rotan (Rattan)	Explanation : Raw rattan
Gondorukem (Gum resin)	Explanation : Resin tapped from pine trees.
Terpentin	Explanation : Processed gondorukem (Turpentin)
Sutera (Silk)	Explanation : Raw Silk
Kayu putih (Cajuput oil)	Explanation : Oil extracted from leaf of melaluca sp.
Gaharu (Agarwood)	Explanation : Agarwood, taken from Aquilaria malaccensis and Aquilaria filaria
Arang (Charcoal)	Explanation : Charcoal

14.2.3 Original data

Following prices were used to calculate value of production (removal) mentioned in Table 13. The value has not been calculated for the products for which information on their prices was not available.

National Class	Unit	Years			Remarks
		1990	2000	2005	
Rattan		NA	NA	NA	
Gum resin	Rp/Ton	600,236*	1,863,756**	NA	
Resin	Rp/Ton	NA	NA	NA	
Turpentin	Rp/Ton	638,575*	1,808,103**	NA	
Silk	Rp/kg	45,546*	172,530**	NA	
Cajuput oil	Rp/kg	13,094*	35,929**	NA	
Charcoal		NA	NA	NA	
Agarwood	Rp/t	NA	10,000,000***	NA	
Bee honey	Rp/kg	NA	10,000****	NA	

Note :

    * Taken from Pocket Statistic Book of Perum Perhutani. Year 1990 – 1994

    ** Estimated from Perum Perhutani Statistic 2001

    *** Taken from Sistem pemasaran gaharu dalam dan luar negeri. This is the value for Super Quality Agarwood. (Paper prepared by Dr. M Faisal Salampessy, SH.Dipl.int)

    ****Personal information from Staff of Directorate General of Land Rehabilitation and Social Forestry, 2001

14.3 Analysis and processing of national data

14.3.1 Estimation and forecasting

Value of Non wood removals was estimated based on the available average prices.

Category	Value USD $1000	
	1990	**2000**
Plant products / raw material 1. Food		
2. Fodder		
3. Raw material for medicine and aromatic products	1,155	1,545
4. Raw material for colorants and dyes		
5. Raw material for utensils. handicrafts & construction		
6. Ornamental plants		
7. Exudates	1,886	10
8. Other plant products		
Animal products / raw material 9. Living animals	718	28.01
10. Hides. skins and trophies	787	49.7
11. Wild honey and bee-wax		1,164
12. Bush meat		
13. Raw material for medicine		
14. Raw material for colorants		
15. Other edible animal products		
16. Other non-edible animal products	-	-
TOTAL	4,546	2 797

14.4 Reclassification into FRA 2005 classes

Same as in Table 13.

14.5 Data for National reporting table T14

FRA 2005 Categories	Value of the of NWFP removed (1000 USD)		
	1990	**2000**	**2005**
Plant products / raw material 1. Food			
2. Fodder			
3. Raw material for medicine and aromatic products	1 155	1 545	
4. Raw material for colorants and dyes			
5. Raw material for utensils. handicrafts & construction			
6. Ornamental plants			
7. Exudates	1 886	10	
8. Other plant products			
Animal products / raw material 9. Living animals	718	28.01	
10. Hides. skins and trophies	787	49.7	
11. Wild honey and bee-wax		1 164	
12. Bush meat			
13. Raw material for medicine			
14. Raw material for colorants			
15. Other edible animal products			
16. Other non-edible animal products	-	-	
TOTAL	4 546	2 797	

14.6 Comments to National reporting table T14

1. Following Non Wood forest product values are not included in above table.

National Class	Unit	Years		
		1990	2000	2005
Butterfies	Individual		1,59	NA
Other insect	Individual		2,26	NA
Mollusca	Individual		0,16	NA

2. To avoid double counting, same as in Table 13, turpentine, which is processed from gum resin, has been excluded from the calculation. The figure for turpentine for year 1990 and 2000 respectively are USD 736,000 and USD1,875,000.

15 Table T15 – Employment in forestry

15.1 FRA 2005 Categories and definitions

Category	Definition
Primary production of goods	Employment in activities related to primary production of goods. Like industrial roundwood, woodfuel and non-wood forest products
Provision of services	Employment in activities directly related to services from forests and woodlands
Unspecified forestry activities	Employment in unspecified forestry activities

15.2 National data

15.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Statistik Perusahaan Pembudidaya Tanaman Kehutanan, Biro Pusat Statistik 2001	H	No. of Person	2000	Will be used as 2000 data
Statistik Perusahaan Hak Pengusahaan Hutan, Biro Pusat Statistik 2001	H	No. of Person	2000	Will be used as 2000 data

15.2.2 Classification and definitions

National class	Definition
Permanent worker	Persons who work permanently in the company
Temporary worker	Persons who work for certain period for certain job.

15.2.3 Original data

A. Primary production of goods for 2000

National Class	No of persons
Permanent worker	44,799
Temporary worker	113,763
Total	158,562

The number employment in the above table does not reflect the actual employment in forestry sectors. The employment included in the table are only those which have direct relation to forestry works and with legal bases such as contract with forestry companies. There are many farmers or people living in forest who are dependent to forest such as the ones collected forest products,

B. Provision of services

Employment for provision of services included in this table is the number of person working for National Parks. Data for provision of services is only available for year 2000 which are 3,203 persons.

15.3 Analysis and processing of national data

15.3.1 Estimation and forecasting

The data available for temporary worker is in term of number of person-days. These person-days were converted to number of person years by assuming that there 240 work days per year.

15.4 Reclassification into FRA 2005 classes

National Class	FRA 2005 categories		
	Primary production of goods	Provision of services	Unspecified forestry activities
Permanent worker	100		
Temporary worker	100		
Total			

15.5 Data for National reporting table T15

FRA 2005 Categories	Employment (1000 person-years)	
	1990	**2000**
Primary production of goods	NA	159
Provision of services	NA	3
Unspecified forestry activities	NA	NA
TOTAL		162

15.6 Comments to National reporting table T15

The Ministry of forestry employees included in this table are only the ones working for National Park. The figure of employment in this table is actually lower than the actual employment in forestry sector in Indonesia.