Forestry Department
Food and Agriculture Organization of the United Nations

GLOBAL FOREST RESOURCES

ASSESSMENT

COUNTRY REPORTS

CAMBODIA

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).

The Global Forest Resources Assessment process is coordinated by the Forestry Department at FAO headquarters in Rome. The contact person for matters related to FRA 2005 is:

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The Global Forest Resources Assessment 2005 Country Report Series is designed to document and make available the information forming the basis for the FRA 2005 reports. The Country Reports have been compiled by officially nominated country correspondents in collaboration with FAO staff. Prior to finalisation, these reports were subject to validation by forestry authorities in the respective countries.

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

1.2   National data

1.2.1   Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Original data from Remote sensing	M	Forest cover 1992/93	1992/93	Little ground truthing to Remote Sensing Data
Original data from Remote sensing	M	Forest cover 1996/97	1996/97	Little ground truthing to Remote Sensing Data
Original data from Remote sensing	M	Forest cover 2002	2002	Based on Remote Sensing and adequate ground truthing

1.2.2   Classification and definitions

A. For 1992/93 and 1996/97

National class	Definition
	Forest
Evergreen forest with high cover density	Forest contains usually multi-storied forests where trees keep their leaves during the whole year. They are always seen on hills and along the course of streams and rivers. Evergreen forests appear dark red on the satellite images with a medium texture. They comprise the lowland tropical rain forests, the hill evergreen forests and the dry evergreen forests. A certain percentage of deciduous trees may be included as well and most moist deciduous forests may not be visible from the evergreen forests. The forest comprises of forest cover ≥ 90% and crown cover ≥70%
Evergreen forest with medium and low cover density	Forests contain usually multi-storied forests where trees keep their leaves during the whole year. They are always seen on hills and along the course of streams and rivers. Evergreen forests appear dark red on the satellite images with a medium texture. They comprise the lowland tropical rain

	forests, the hill evergreen forests and the dry evergreen forests. A certain percentage of deciduous trees may be included as well and most moist deciduous forests may not be visible from the evergreen forests. The forests comprise of forest cover ≥ 70% - < 90% and crown cover ≥ 20 % - < 70%
Evergreen mosaic forest	Forests contain usually multi-storied forests where trees keep their leaves during the whole year. They are always seen on hills and along the course of streams and rivers. Evergreen forests appear dark red on the satellite images with a medium texture. They comprise the lowland tropical rain forests, the hill evergreen forests and the dry evergreen forests. A certain percentage of deciduous trees may be included as well and most moist deciduous forests may not be visible from the evergreen forests. The forests comprise of forest cover ≥ 40% - < 70% and crown cover ≥ 20%
Mixed evergreen and deciduous forest with high cover density	The forests contain a variable percentage of evergreen and deciduous trees. The percentage deciduous trees may vary from some 30 to some 70 percent. The variability of this class is high as it is stretching from the moist mixed deciduous forests to the mixed deciduous and to a more humid version of the dry deciduous forests. It can not be excluded that depending on the proportion of leaf shedding trees and on the overall appearance some parts of dry evergreen forests are mapped to this class as well. The forest comprises of forest cover ≥ 90% and crown cover ≥70%
Mixed evergreen and deciduous forest with medium and low cover density	The forests contain a variable percentage of evergreen and deciduous trees. The percentage deciduous trees may vary from some 30 to some 70 percent. The variability of this class is high as it is stretching from the moist mixed deciduous forests to the mixed deciduous and to a more humid version of the dry deciduous forests. It can not be excluded that depending on the proportion of leaf shedding trees and on the overall appearance some parts of dry evergreen forests are mapped to this class as well. The forests comprise of forest cover ≥ 70% - < 90% and crown cover ≥ 20 % - < 70%
Mixed mosaic forest	The forests contain a variable percentage of evergreen and deciduous trees. The percentage deciduous trees may vary from some 30 to some 70 percent. The variability of this class is high as it is stretching from the moist mixed deciduous forests to the mixed deciduous and to a more humid version of the dry deciduous forests. It can not be excluded that depending on the proportion of leaf shedding trees and on the overall appearance some parts of dry evergreen forests are mapped to this class as well. The forests comprise of forest cover ≥ 40% - < 70% and crown cover ≥ 20%.
Deciduous forest	The forests contain the dry mixed deciduous forests and dry Dipterocarp forests. Deciduous forests drop their leaves more or less completely during the dry season. The signatures vary from reddish violet to yellowish brown at the end of wet season, and from brownish green to bluish grey during the dry season, with a medium to smooth texture. Human impact such as fire is usually much higher compared to other forest types. It was not possible to separate consistently the dry mixed deciduous forests from the dry Dipterocarp forests. Dry Dipterocarp forests have naturally an open character. Undisturbed they may have a crown cover of only 40%. The soil and the grass layer can have a significant impact on the reflection of these forests. It is impossible to separate crown cover differences consistently. The separation to deciduous shrub-land is difficult during the wet season and almost impossible during the dry season.
Deciduous mosaic forest	The characteristic of the forests is nearly the same as Deciduous forest, just different from the density of forest cover and crown cover. The forest cover varies from ≥ 40% - < 70% and crown cover ≥ 20%.
Forest regrowth	More or less dense layer of young trees belonging already to the 'forest cover' class. The spatial texture is usually homogenous. No differentiation in density classes foreseen. General re-growth of mixed vegetation would be assigned to 'Non-Forest Re-growth'
Inundated forest regrowth	Forest regrowth found in the inundated areas around the Tonle Sap Lake was mapped as a separate class.

Inundated forest	This forest type is found in Cambodia around the Tonle Sap Lake. Most of the forests are low and disturbed. In many cases there is only a mosaic remaining. Degradation was often caused by charcoal production.
Mangrove forest	Mangrove forests can only be found in the South Western part of Cambodia.
Forest plantation	Forest plantations are often visible due to their textures and geometric shapes, species should be assigned when the knowledge of the local conditions allows to do so, otherwise '0'.
Inundated mosaic forest	The characteristic of the forests is nearly the same as inundated forest, just different from the density of forest cover and crown cover. The forest cover varies from $\geq 40\%$ - $< 70\%$ and crown cover $\geq 20\%$.
Wood and shrubland evergreen	Wood and shrub-land is a mixture of shrubs, grass and trees, the tree cover however remaining below 20 percent. This class can be found mainly on shallow soils, on the top of mountains under climax conditions or as a result of non-sustainable land use (degraded land, forest on fire frequently). The signature remains light red during the whole year. A sub-variant of this class represents the re-growth of forest, i.e., growing after shifting cultivation. There is usually a dense layer of shrubs and grass with some small trees and a significant proportion of bamboo. Other sub-variants diversely comprise land areas, trees, shrubs, grass and small paddy fields on lowland as long as the agriculture land is not cancelled.
Bamboo	Large areas of dense bamboo are usually discernible due to their pink and orange colour and their typical texture. After the field trips it was decided to map all bamboo visible into one class. A sparse bamboo coverage or small bamboo will not be discernible and will remain in one of the classes mentioned before. Small lots of bamboo as result of degradation of mixed deciduous or evergreen forests will also not be included in this class.
Wood and shrubland dry	Wood and shrub-land is a mixture of shrubs, grass and trees, the tree cover however remaining below 20 percent. This class can be found in the dry plains or on the plateaus of the southern part of the L.M.B, but also on dry and sun exposed slopes. The appearance often remains on a dry "savanna". The signature is light grey during the dry season and light brownish grey to violet during the wet season, the texture is medium to rough.
Wood and shrubland inundated	Wood and shrub-land is a mixture of shrubs, grass and trees, the tree cover however remaining below 20 percent. This class was defined to cover the degraded inundated areas around the Tonle Sap Lake. There is often a dense layer of small trees, which can not be classified as forest.
Non-forest	
Grassland	In dry conditions grassland is displayed in bluish grey tones during the dry season showing a smooth texture. In the humid domain grassland looks light red with a component of yellow to white during the dry season.
Mosaic of cropping where cropping area < 30%	This class contains a mixture of fields actually under cropping or in various stages of fallow with shrubs and re-growth. The pattern shows a mosaic of red, white, grey and black patches. Re-growth is found in shifting cultivation areas after the land has been abandoned and contains also young trees. If not cleared again, the chances of becoming forest are theoretically high. Small tree blocks can be found within this class as well, however the percentage of forest blocks should be below 40%, otherwise they would have to be classified as "mosaic of forest" (fragmented forests). This class the cropping area < 30%. The experienced interpreter should do the delineation of the two classes because there are several possibilities to draw the boundary line. Whether to include several patches in one big block or whether to delineate the patches of mosaic separately should be decided by minimizing the total boundary line for these features. It increases consistency of the classification if the delineation of this class is done or checked by the same interpreter.
Mosaic of cropping where cropping area > 30%	The characteristic of this class is nearly the same as Mosaic of cropping where cropping area < 30% except for the percentage of cropping area.
Agriculture land	It is delineated as one class without further differentiation. It contains

	permanent fields, mainly paddy fields, or mixed agricultural land, as long as the agricultural component appears to be dominant. Additional knowledge of the area is often required for a good interpretation. Permanent mixed agriculture on slopes, as occurred frequently in the Central Highlands of Vietnam is difficult to separate from shifting cultivation.
Barren land	Not vegetated areas
Rock	Rock
Urban area	If a village can be found this class IS classified. Small villages contain fruit trees and trees without clear boundaries. The urban area of the village may be done afterwards by using GIS.
Water	Sea, lakes, rivers etc.
Other	This class belongs to unidentified class.
Wetland	Wetlands contain swamps and marshes. Due to the high water content the signatures are usually dark grey, in case of a grass layer the dark tones are mixed with light red to pink tones.

B. For 2002

The remote sensing data was filtered into following five classes only that are aggregation of the above as indicated in the original data in section 1.2.3.

National class	Definition 2002
Forest	
Evergreen forest	Forest contains usually multi-storied forests where trees keep their leaves during the whole year. They comprise the lowland tropical rain forests, the hill evergreen forests and the dry evergreen forests. It includes Evergreen forest classified as high cover density, medium and low density during earlier remote sensing efforts.
Semi- evergreen	The forests contain a variable percentage of evergreen and deciduous trees.. It includes mixed evergreen forest classified as high cover density, medium and low density and mixed mosaic forests during earlier remote sensing efforts.
Deciduous forest	The forests contain the dry mixed deciduous forests and dry Dipterocarp forests. It includes deciduous forest classified as deciduous and mosaic forests during earlier remote sensing efforts.
Other forests	The forests contain a variable percentage of following categories defined in earlier remote sensing efforts. Forest Re-growth, Inundated forests re-growth, Inundated forests Mangrove forests, Forest Plantation, and Inundated Mosaic forests
Bamboo	Large areas of dense bamboo are usually discernible due to their pink and orange colour and their typical texture. After the field trips it was decided to map all bamboo visible into one class. A sparse bamboo coverage or small bamboo will not be discernible and will remain in one of the classes mentioned before. Small lots of bamboo as result of degradation of mixed deciduous or evergreen forests will also not be included in this class.
Wood and shrub evergreen	Wood and shrub-land is a mixture of shrubs, grass and trees, the tree cover however remaining below 20 percent. It represents wood and shrub land evergreen category of earlier remote sensing efforts.
Wood and shrub dry	This category of wood and shrub-land can be found in the dry plains or on the plateaus of the southern part of the L.M.B, but also on dry and sun exposed slopes. It represents wood and shrub land dry category of earlier remote sensing efforts.
Non Forest	It contains a variable percentage of following categories of earlier remote sensing efforts. Grass land, Mosaic of cropping, Agriculture land, Barren land, Rock Urban Area, Water, Other, Wetland, and area that in satellite imagery were covered with Cloud.

1.2.3. Original Data

Code	Land Cover Types	1992/93 Area (1000 ha.)	1996/97 Area (1000 ha.)	2002 Area (1000 ha.)
	Forest			
11	Evergreen forest with high cover density	656.582	627.219	3720.507
12	Evergreen forest with medium and low cover density	3254.204	3185.603	
13	Evergreen mosaic forest	131.651	178.150	
17	Mixed evergreen and deciduous forest with high cover density	98.851	95.322	1455.095
18	Mixed evergreen and deciduous forest with medium-low cover density	1309.010	1286.649	
19	Mixed mosaic forest	110.103	125.331	
20	Deciduous forest	4026.133	3931.292	4833.135
22	Deciduous mosaic forest	342.851	350.193	
40	Forest regrowth	435.353	374.178	1065.706
41	Inundated forest regrowth	21.623	20.819	
52	Inundated forest	229.093	219.896	
53	Mangrove forest	77.244	72.457	
54	Forest plantation	72.354	82.472	
56	Inundated mosaic forest	98.587	94.582	
61	Wood and shrubland evergreen	558.864	544.753	150.017
65	Wood and shrubland inundated	377.401	348.959	
64	Wood and shrubland dry	1267.281	1164.743	138.935
63	Bamboo	32.209	33.715	28.951
	Non-forest			
62	Grassland	478.486	488.919	6768.325
81	Mosaic of cropping where cropping area < 30%	198.908	285.227	
82	Mosaic of cropping where cropping area > 30%	104.428	143.756	
91	Agriculture land	3698.464	3903.605	
92	Barren land	14.973	18.022	
93	Rock	2.149	2.323	
94	Urban area	26.606	27.638	
95	Water	446.317	469.294	
96	Other	1.756	1.756	
97	Wetland	87.351	83.458	
99	Clouds	1.497	0.000	
	Grand Total	18160.331	18160.331	18160.670

1.3 Analysis and processing of national data

1.3.1 Calibration

The total country area has been calibrated to match with FAOSTAT figure of 18104 (000 ha).
Similarly the area of inland water bodies has been calibrated to match FAOSTAT figure of
452 (000 ha). All differences have been adjusted only in the area of other lands.

1.3.2 Estimating and Forecasting

Similarly Bamboo has been grouped together with Forests as in FRA 2000. All types of wood
and Shrub lands have been grouped together as Wood and Shrub lands.

A. Segregation of 2002 figures.

The 2002 figures provide aggregated figures for some of the categories that make it difficult to estimate and forecast and classify figures for FRA 2005. Specifically, 2002 provides an aggregated figure of 1065706 ha for area of forest regrowth, inundated forest regrowth, inundated forests, Mangrove forests, forest plantations and inundated forest mosaic. This figure has been segregated in following steps.

 (a) Forecasting 2002 area (314288) of inundated (forests +mosaic+regrowth) based on 1992 and 1996
 (b) Forecasting 2002 area (65277) of Mangrove forests based on 1992 and 1996 figures
 (c) Using figure (67000 ha) of productive plantations for 2002 from Table 4

The remainder area (619142 ha) out of 1065706 ha has been treated as area of forest re-growth.

B. Summary information for 1992, 1996 and 2002 after above steps

Categories	Area in hectares		
	1992	**1996**	**2002**
Evergreen	4042435	3990972	3720507
Mixed	1517964	1507302	1455095
Deciduous	4368984	4281485	4833135
Bamboo	32209	33715	28951
Inundated (Forest+ Re-growth+ Mosaic)	349303	335297	314288
Mangrove	77244	72457	65277
Forest Plantation	72354	82472	67000
Forest Regrowth	435353	374178	619142
Total Forests	**10895846**	**10677878**	**11103395**
Total Wood and Shrub land	**2203546**	**2058455**	**286952**
Total Forest and Other Wooded Land	13099392	12736333	11390347
Total Other land	**4552608**	**4915667**	**6261653**
Inland water bodies	**452000**	**452000**	**452000**
Total	**18104000**	**18104000**	**18104000**

C. Calibration of figures for certain categories of landuse

The above figures show abnormal trends under certain categories like "wood and shrub land", "Deciduous forests" and "Forest Regrowth" . This is attributed mainly to the fact that except for 2002 figures very little ground truthing (field checking) of satellite interpreted data was done for 1993 and 1996 due to war and economy reasons. Therefore, for the purposes of this table figures for "wood and shrub land" equalling the FRA category "other wooded land" were calibrated in following manner: All the forest categories were grouped into one and the percentage (about 2.52%) of "wood and shrub land" to total of "forests" and "wood and shrub land" in 2002 were applied to respective figures in 1992 and 1996 to estimate "wood and shrub land" and "forests" in these years.

Categories	1992	1996	2002
Forests	12769287	12415377	11103395
Wood and Shrub land	330105	320956	286952
Total Other land	4552608	4915667	6261653
Inland water bodies	452000	452000	452000
Total	18104000	18104000	18104000

D. Estimation and Forecasting

Estimation and forecasting has been done for 1990, 2000 and 2005 using linear-inter or linear-extrapolation method and with all adjustments in "Other land".

Categories	Area in hectares		
	1990	**2000**	**2005**
Forests	12946242	11540722	10447404
Wood and Shrub land	334679	298287	269950
Other land	4371079	5812991	6934646
Inland water bodies	452000	452000	452000
Total	18104000	18104000	18104000

1.4   Reclassification into FRA 2005 classes

National Categories	Percentage allocation to FRA categories			
	Forests	Other Wooded lands	Other land	Inland Water bodies
Forests	100			
Wood and Shrub land		100		
Other land			100	
Inland water bodies				100

1.5   Data for National reporting table T1

FRA 2005 categories	Area (1000 hectares)		
	1990	**2000**	**2005**
Forest	12946	11541	10447
Other wooded land	335	298	270
Other land	4371	5813	6935
...of which with tree cover [1]			
Inland water bodies	452	452	452
Total for country	18104	18104	18104

1.6   Comments to National reporting table T1

1. The difference in forest area in FRA 2000 and FRA 2005 is mainly caused by the different definition (reclassification) and estimation process. It may also be mentioned that the former definition of forest of Forestry Administration, a land is classified as forest when it has a forest cover more than 20% where as FAO's definition, only 10% of forest cover is necessary for this purpose.

2. The reason for differences in national figures for total country area may be because now the country is using boundaries defined by its Department of Geography while for FRA 2000 boundaries defined by MRC (Mekong River Commission) were used.

3. The calibration has been done only for the purposes of the FRA 2005 report otherwise country wishes to maintain its figures from Department of Geography.

4. The 1992. 1996 and 2002 presents unexplainable trends in some categories like "wood and shrub land", "Deciduous forests" and "Forest Re-growth" . This is attributed mainly to the fact that except for 2002 figures very little ground truthing (field checking) of satellite interpreted data was done for 1993 and 1996 due to war and economy reasons. Therefore, for the purposes of this table figures for "other wooded lands for 1990 and 2000 were estimated by applying percentage of "other wooded land" in 2002 to 1992 and 1996 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

There is lack of proper demarcation of Cambodian forest estate. According to the forestry law all forest land belongs to the state, therefore it has been assumed that all the forest lands belong to the state. Further, beside the Forest Administration, there are no private investments in forest plantations.

2.2.2   Classification and definitions

No national definition and classification for ownership.

2.2.3   Original data

No national information is available on ownership of forests.

2.3   Analysis and processing of national data

2.3.1   Calibration

This step is not necessary as information is being directly used from Table 1.

1.6.1   2.3.2   Estimation and forecasting

This step is not necessary as information is being directly used from Table 1.

2.4   Reclassification into FRA 2005 classes

This step is not necessary as information is being directly used from Table 1.

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	0	0
Public ownership	12946	11541	335	298
Other ownership	0	0	0	0
TOTAL	12946	11541	335	298

2.6   Comments to National reporting table T2

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

There is no direct information available by these categories. The required information is being derived by making various assumptions as mentioned at relevant places.

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)
World Bank, 1996. Cambodia Forest Policy Assessment. Report No 15777-KH. The World Bank.	M	Concession Areas	Before 1996
KC. 2004. National Report to the fifth session of the United Nations Forum on Forests. Kingdom of Cambodia	M	Concession Areas	2004
Royal Decree, 1993. Government of Cambodia	H	Protected Area	1993
Royal Decree, 2004. Government of Cambodia	H	Protected Area	2004
Original GIS data source	M	Protected Areas	

3.2.2   Classification and definitions

FRA 2005 definitions are being used to derive the required information.

3.2.3 Original data

A. Concession Areas (Production Areas)

These are identified for promoting forest based development and are considered as production forests as defined by FRA 2005. The area of forest under concession prior to 1994 (World Bank, 1996) and in 1996 was about 2.244 million hectares and 6.464 million hectares respectively. The area has reduced to about 3.374 million hectares in 2004. (KC, 2004).

B. Protection Areas

Type of Protection Area	Area in 2004	Area (1000 ha)		
		Royal Decree 1993	Royal Decree 2004	GIS Data (1997)
Watershed Protection	Kbal Chay (2004)	0	6	6
Watershed and Biodiversity Conservation	Cardamom (2004)	0	401	401
Zoo	Ta Moa (1997)	0	1	2
Biodiversity Conservation	Snoul_dfw (2004)	0	305	298
	Preah Vihear_dfw (2004)	0	190	190
	Mondul Kirri (2004)	0	429	429
Crane Conservation	Ang Trapeng Thmor (2004)	0	13	13
National Park	Virachey (before 1993)	333	333	338
	Phnom Kulen (before 1993)	38	38	38
	Botum Sakor (before 1993)	171	171	183
	Kirirom (before 1993)	35	35	28
	Phnom Bokor (before 1993)	140	140	142
	Ream (before 1993)	21	21	15
	Kep (before 1993)	5	5	7
Wildlife Sanctuary	Kulen Promtep (before 1993)	403	403	407
	Lomphat (before 1993)	250	250	251
	Beng Per (before 1993)	243	243	249
	Phnom Prich (before 1993)	223	223	222
	Phnom Nam Lyr (before 1993)	48	48	54
	Phnom Samkos (before 1993)	334	334	331
	Phnom Aural (before 1993)	254	254	257
	Snoul (before 1993)	75	75	74
	Peam Krasop (before 1993)	24	24	25
	Roniem Daun Sam (before 1993)	179	40	40
Protected Landscape	Preah Vihear (before 1993)	5	5	5
	Banteay Chhmar (before 1993)	81	81	82
	Angkor (before 1993)	11	11	14
Multiple Landuse	Tonle Sap (before 1993)	316	316	322
	Samlaut (before 1993)	60	60	60
	Dong Peng (before 1993)	28	28	29
Total		3277	4483	4512

The differences between the area in Royal Decree and the area in GIS data caused by the boundaries and area of the protected areas were drawn and calculated by hand and then the boundaries and area were transferred into GIS format in 1997. All figures are processed based on forest cover data and protected area data through GIS spatial analysis with resolution 50 meters grid cell.

However the area under protected area in 2004 after some reductions in the original Royal decree of 1993 is about 3.128 million ha (KC, 2004),

3.3   Analysis and processing of national data

3.3.1   Calibration

This step is not necessary.

3.3.2   Estimation and forecasting

A. Concession Areas

It is assumed that figure (2.244 million ha) of areas under concession prior to 1994 reflects the state in 1990. The figure (4.919 million ha) for 2000 has been derived by linear interpolation of 1996 figure of (6.464 million ha) and 2004 figure (3.374 million ha). The figure for 2004 is assumed for 2005.

B. Protection of Soil and Water

The area of 407 (000 ha) specifically designated for watershed conservation in 2004 is considered as area under protection for soil and water in 2005.

C. Multiple purpose

Area of about 404 (000 ha) designated for multiple landuse since 1993 (and before) is being considered as area under multiple purposes for 1990, 2000 and 2005.

D. Social Services

Area of about 97 (000 ha) of designated for protected landscapes since 1993 (and before) is being considered as area under social services for 1990, 2000 and 2005.

E. Conservation of Biodiversity

The figure (3277 less 97 under Social Services and less 404 under multiple purposes) of areas under "Protection areas" in 1993 is assumed for 1990. The figure (3128 less 404 under multiple land use, less 97 under Social Services and less 407 under protection to soil and water) of protection areas for 2004 is assumed for 2005. The figure (2405 000 ha) for 2000 is derived by linear interpolation of above derived figures for 1990 and 2005.

3.4   Reclassification into FRA 2005 classes

A. Primary Function

Forest	Production	Protection of Soil and Water	Conservation of Biodiversity	Social Service	Multiple Purpose	No or Unknown Function
Concession Areas	100%					
Watershed Protection		100%				
Zoo, Biodiversity Conservation, Crane Conservation, National Park,			100%			

Wildlife Sanctuary						
Protected Landscape				100%		
Multiple Landuse					100%	
Unknown						100%

B. Total Area with Function

Forest	Production	Protection of Soil and Water	Conservation of Biodiversity	Social Service	Multiple Purpose	No or Unknown Function
Concession Areas	100%					
Watershed Protection		100%	100%			
Zoo, Biodiversity Conservation, Crane Conservation, National Park, Wildlife Sanctuary		100%	100%			
Protected Landscape				100%		
Multiple Landuse	100%	100%		100%		
Unknown						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	2,244	4919	3374	2,648	5,323	3,778
Protection of soil and water	0	0	407	3180	2809	3031
Conservation of biodiversity	2776	2405	2220	2776	2405	2627
Social services	97	97	97	501	501	501
Multiple purpose	404	404	404	not appl.	not appl.	not appl.
No or unknown function	7,425	3,716	3,945	not appl.	not appl.	not appl.
Total – Forest	**12946**	**11541**	**10447**	**not appl.**	**not appl.**	**not appl.**
Other wooded land						
Production						
Protection of soil and water						
Conservation of biodiversity						
Social services						
Multiple purpose				not appl.	not appl.	not appl.
No or unknown function	335	298	270	not appl.	not appl.	not appl.
Total – Other wooded land	**335**	**298**	**270**	**not appl.**	**not appl.**	**not appl.**

3.6   Comments to 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

There is no direct information available by these categories. The required information is being derived by making various assumptions as mentioned at relevant places.

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)
World Bank, 1996. Cambodia Forest Policy Assessment. Report No 15777-KH. The World Bank.	M	Concession Areas	Before 1996
KC. 2004. National Report to the fifth session of the United Nations Forum on Forests. Kingdom of Cambodia	M	Concession Areas	2004

4.2.2   Classification and definitions

FRA 2005 definitions are being used to derive the required information

4.2.3 Original data

The area of primary forest was estimated through GIS where the forest cover density is higher than 90% and access roads are not clearly visible. Area of productive plantations for 1992 and 1996 is from Table 1.

National Categories	Area (1000 hectares)					
	Forest			Other wooded land		
	1992	1996	2002	1992	1996	2002
Primary	755	723	322	n.a.	n.a.	n.a.
Productive plantations	72	83	67	n.a.	n.a.	n.a.

4.3   Analysis and processing of national data

4.3.1   Calibration

This step is not necessary.

4.3.2   Estimation and forecasting

A. Primary Forest

The forest areas where the forest cover density is higher than 90% and access roads are not clearly visible on GIS. The liner interpolation provides following figures for 1990 and 2000. Since linear interpolation was providing too low figure for 2005, therefore the figure of 2002 has been assumed for 2005.

National Categories	Area (1000 hectares)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Primary	766	456	322	n.a.	n.a.	n.a.

B. Forest Plantations

The area of forest under productive plantations (Table 1).

National Categories	Area (1000 hectares)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Productive Plantation	69	72	59	n.a.	n.a.	n.a.

C. Modified Forests

The areas of forests other than primary and plantations are being assumed as modified natural forests.

National Categories	Area (1000 hectares)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Modified Forest	2244	4919	4919	n.a.	n.a.	n.a.

D. Other Wooded lands

There is no information on characteristics of OWL. It is assumed that all OWL belong to modified natural forest category.

4.4   Reclassification into FRA 2005 classes

This step is not considered necessary

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	766	456	322	n.a.	n.a.	n.a.
Modified natural	12113	11013	10066	335	298	270
Semi-natural	0	0	0	n.a.	n.a.	n.a.
Productive plantation	67	72	59	n.a.	n.a.	n.a.
Protective plantation				n.a.	n.a.	n.a.
TOTAL	12946	11541	10447	335	298	270

4.6   Comments to National reporting table T4

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 X 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 Z cm or more.

5.2 National data

5.2.1 Data sources

No information is available except from growing stock per hectare estimates from an old FAO inventory.

5.2.2 Classification and definitions

No information on national definitions or classes is available.

5.2.3 Original data

Estimate of per hectare growing stock for three major forest types (evergreen, Mixed and Deciduous) are only available from old FAO supported inventory and no new estimates are available. (Email of National Correspondent of December 18th, 2005).

National class	Growing Stock (m³/ha)
Evergreen forest with high cover density	230
Evergreen forest with medium and low cover density	165 (average of 230 and 100)
Evergreen mosaic forest	100
Mixed evergreen and deciduous forest with high cover density	145 (average of 230 and 60)
Mixed evergreen and deciduous forest with medium and low cover density	80 (average of 100 and 60)
Mixed mosaic forest	50 (average of 40 and 60)
Deciduous forest	60
Deciduous mosaic forest	60 (assumed same as deciduous)
Forest regrowth	Not considered
Inundated forest regrowth	Not considered
Inundated forest	20
Mangrove forest	20
Forest plantation	
Inundated mosaic forest	20
Bamboo	20
Wood and shrub land evergreen	Data not available
Wood and shrub land dry	Data not available
Wood and shrub land inundated	Data not available

5.3 Analysis and processing of national data

5.3.1   Calibration

This step is not necessary as area estimates are taken from Table 1.

5.3.2   Estimation and forecasting

A. Weighted Growing stock per hectare for three major forest types

Forest Types	Area (ha)	GS/ha	Volume (m3)	Weighted GS/ha
A. Evergreen				
For 1992				
Evergreen Dense	656582	230	151013860	
Evergreen Disturbed	3254202	165	536943330	
Evergreen Mosaic	131651	100	13165100	
Total	4042435		701122290	173.44
For 1996				
Evergreen Dense	627219	230	144260370	
Evergreen Disturbed	3185603	165	525624495	
Evergreen Mosaic	178150	100	17815000	
Total	3990972		687699865	172.31
B. Mixed				
For 1992				
Mixed Dense	98851	145	14333395	
Mixed Disturbed	1309010	80	104720800	
Mixed Mosaic	110103	50	5505150	
Total	1517964		124559345	82.06
For 1996				
Mixed Dense	95322	145	13821690	
Mixed Disturbed	1286649	80	102931920	
Mixed Mosaic	125331	50	6266550	
Total	1507302		123020160	81.62
C. Deciduous				60.00
D. Inundated, Mangrove and Bamboo Forests				20.00

B. Weighted Growing stock per hectare for Plantations

The estimates for growing stock of plantations are not available. Therefore following method has been followed.

(a) Grouping plantation area by species and age

Information about area by age of plantations is available only for 11.75 (000 ha) from country information collected for FRA 2000. An average net MAI of about 1 cubic meter/ha/annum is being assumed for net area under plantations to estimate weighted GS/ha in plantations. Further, it is assumed that the estimated weighted average will be applicable to all the forest areas under plantations.

Category by age of (forest species) plantations	Area 000 ha	Assumed GS/ha	Volume (000 cubm)	Weighted GS/ha
More than 40 years	3.3	40	132	
About 20 years	1.75	20	35	
Less than 20	6.7	10	67	
Total	11.75			20

C. Weighted Growing Stock per hectare of "forests"

The percentage composition of forests in 2002 has been used to calculate following weighted average of growing stock of forests per ha in 1992 and 1996 because only 2002 provide figures with reasonable ground verification.

Type of forests	Percentage Composition (2002)	1992		1996	
		GS/ha	Weighted GS/ha	GS/ha	Weighted GS/ha
Evergreen	33.51	173.44		172.31	
Mixed	13.10	82.06		81.62	
Deciduos	43.53	60		60	
Bamboo	0.26	20		20	
Inundated (Forest +Mosaic +Regrowth)	2.83	20		20	
Mangrove	0.59	20		20	
Forest Plantation	0.60	20		20	
Forest Regrowth	5.58	20		20	
Total Forests	100.00		96.96		96.52

D. Weighted Growing Stock per ha of forests for FRA reference years

Weighted Growing Stock cubic meter per hectare

Category	1992	1996	1990	2000	2005
Growing stock per ha in Forests	96.96	96.52	97.18	96.08	95.53

D. Estimation of Growing Stock and Commercial Growing Stock

It has been assumed that commercial growing stock is about 40 percent of the total growing stock.

Variable	Unit	1990	2000	2005
Forest Area	000 ha	12946	11541	10447
GS/ha	cubic meter per ha	97.18	96.08	95.53
Growing Stock	million cubic meter	1258	1109	998
CGS (40 percent)	million cubic meter	503	444	399

5.4   Reclassification into FRA 2005 classes

This 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	1258	1109	998	N/A	N/A	N/A
Commercial growing stock	503	444	399	N/A	N/A	N/A

(Note : commercial growing stock is assumed to be about 40 percent of the Growing stock)

Specification of country threshold values	Unit	Value	Complementary information
1. Minimum diameter at breast height of trees included in Growing stock (X)	cm		
2. Minimum diameter at the top end of stem (Y) for calculation of Growing stock	cm		
3. Minimum diameter of branches included in Growing stock (W)	cm		
4. Minimum diameter at breast height of trees in Commercial growing stock (Z)	cm		
5. Volume refers to "Above ground" (AG) or "Above stump" (AS)	AG / AS		
6. Have any of the above thresholds (points 1 to 4) changed since 1990	Yes/No		
7. If yes, then attach a separate note giving details of the change	Attachment		

5.6 Comments to National reporting table T5

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

This table utilises information in Table 5.

6.2.2 Classification and definitions

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

6.2.3 Original data

This table utilises information in Table 5.

6.3   Analysis and processing of national data

6.3.1   Calibration

This step is not necessary

6.3.2 Estimation and forecasting

A. Wood density

An average wood density of 0.6 has been assumed for all species composing the growing stock.

B. Biomass Expansion Factor (BEF)

Biomass Expansion factor has been calculated by using following formula (Sandra Brown, 1997. Estimating Biomass Change in Topical Forests. A Primer. FAO Forestry Paper No. 134) and its value is 3.18.

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

C. Root Shoot Ratio

The default value of 0.33 of "Root to shoot ratio" has been adopted from GPG, 2003 to estimate Below Ground Biomass.

D. Dead to Live Ratio

The default value of 0.11 of " Dead to Live Ratio" has been adopted from GPG, 2003 to estimate Deadwood biomass.

Above assumptions lead to the following figures.

Variables	Units	FRA Reference Years		
		1990	**2000**	**2005**
Growing stock	million cubic meter	1258	1109	998
Wood density		0.6	0.6	0.6
Stem biomass	Million ton	755	665	599
Forest Area	000 ha	12946	11541	10447
Biomass/ha	Ton/ha	58	58	57
BEF		3.18	3.18	3.18
Above Ground Biomass	million ton	2400	2116	1904
Below Ground Biomass (0,33 Root to Shoot Ratio)	million ton	793	698	628
Total Live biomass	million ton	3193	2814	2532
Dead Wood Biomass (0.11 Dead to Live Ratio)	million ton	351	309	279

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	2400	2116	1904	N/A	N/A	N/A
Below-ground biomass	793	698	628	N/A	N/A	N/A
Dead wood biomass	351	309	279	N/A	N/A	N/A
TOTAL	3544	3123	2811			

6.6   Comments to National reporting table T6

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

This table utilises information in Table 6.

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 forest area less inundated forest (2.83%) areas.

Above assumptions lead to following figures.

Variable	Units	FRA Reference Years		
		1990	2000	2005
Above Ground Biomass	million tonnes	2400	2116	1904
Carbon in Above Ground Biomass	million tonnes	1200	1058	952
Below Ground Biomass	million tonnes	792	698	628
Carbon in Below Ground Biomass	million tonnes	396	349	314
Dead Wood Biomass	million tonnes	351	310	279
Carbon in Dead Wood Biomass	million tonnes	176	155	139
Forest Area less inundated forests	million ha	13	11	10
Carbon in forest litter	million tonnes	26	24	21

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	1200	1058	952	n.a.	n.a.	n.a.
Carbon in below-ground biomass	396	349	314	n.a.	n.a.	n.a.
Sub-total: Carbon in living biomass	**1596**	**1407**	**1266**	n.a.	n.a.	n.a.
Carbon in dead wood	176	155	139	n.a.	n.a.	n.a.
Carbon in litter	26	24	21	n.a.	n.a.	n.a.
Sub-total: Carbon in dead wood and litter	**202**	**178**	**161**	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	**1798**	**1585**	**1427**			

7.6   Comments to National reporting table T7

8   Table T8 – Disturbances affecting health and vitality

No information is available for this table.

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)
GOKH. 2004 Forest Gene Conservation Strategy	M	Threatened Species	2004
In: IUCN 2004. *2004 IUCN Red List of Threatened Species.* www.redlist.org	M	Threatened Species	2004

9.2.2 Classification and definitions

No information on national classes and definition is available.

9.2.3   Original data

A. Priority Tree Species for Gene Conservation

No.	Scientific Name
1	*Dalbergia oliveri*
2	*Aquilaria crassna* Pierre
3	*Dalbergia cochinchinensis* Pierre
4	*Gardenia ankorensis* Pit
5	*Afzelia xylocarpa* (Kruz) Craib
6	*Pterocarpus macrocarpus* Kurz
7	*Dysoxylum loureiri* Pierre
8	*Diospyros cruenata* Thwaites
9	*Lasianthus kamputensis* Pierre ex. Pit
10	*Diospyros bejaudii* Lecomte
11	*Fagraea fragrans* Pit
12	*Dasymaschalon lementaceum* Finet et Gagnep
13	*Shorea cochinchinensis Pierre*
14	*Hopea helferi* (Dyer) Brandis
15	*Pinus merkusii* Jungh et de Vries

16	*Garcinia hanburyi* Hook.f.
17	*Cinnamomum cambodianum* Lecomte
18	*Sterculia lychnophora* Hance
19	*Cananga latifolia* (Hook.f. & Thomson) Finet et Gagnep
20	*Albizia lebbek* (L.) Benth
21	*Hopea odorata* Roxb
22	*Tarrietia javanica* Blume
23	*Diospyros pilosanthera* Blanco
24	*Hopea ferrea* Laness
25	*Xylia dolabriformis* Benth
26	*Fibraurea tinctoria* Lour
27	*Shorea hypochra* Hance
28	*Shorea Vulgaris* Pierre
29	*Diospyros nitida* Merr

B. The following information is from the IUCN Red List 2004

(a). Critically Endangered species

1 Aglaia pleuropteris
2 Aquilaria crassna
3 Dipterocarpus baudii
4 Dipterocarpus dyeri
5 Dipterocarpus turbinatus
6 Hopea helferi
7 Hopea latifolia
8 Hopea siamensis
9 Shorea hypochra
10 Shorea thorelii

(b). Endangered Species

1 Afzelia xylocarpa
2 Anisoptera costata
3 Dalbergia bariensis
4 Dalbergia cambodiana
5 Dipterocarpus alatus
6 Dipterocarpus costatus
7 Hopea ferrea
8 Hopea pedicellata
9 Hopea pierrei
10 Hopea recopei
11 Shorea henryana
12 Shorea roxburghii
13 Vatica cinerea

(c) Vulnerable Species

1 Cycas pectinata
2 Cycas siamensis
3 Dalbergia cochinchinensis
4 Hopea odorata
5 Intsia bijuga
6 Mangifera flava
7 Pterocarpus indicus
8 Wrightia lecomtei
9 Xylopia pierrei

9.3   Data for National reporting table T9

FRA 2005 Categories	Number of species (year 2000)
Native tree species	862
Critically endangered tree species	10
Endangered tree species	13
Vulnerable tree species	9

9.4   Comments to National reporting table T9

10 Table T10 – Growing stock composition

No information is available for this table.

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)
KKH. 2002 Cambodia: Forestry Statistics to 2002. Kingdom of Cambodia.	M	Removal	2002
World Bank. 1996. Cambodia Forest Policy Assessment	H	Removal	1996
KKH. 2004. National Report to the Fifth Session of the United Nations Forum on Forests. Kingdom of Cambodia.	H	Removal	2004

11.2.2 Classification and definitions

No national classification and definitions are available for this Table

11.2.3 Original data

Forest Concession Company	Quantity in cubic meters					
	1996	1997	1998	1999	2000	2001
COLEXIM	50,275	58,977	47,906	41,194	28,297	17,357
CASOTIM	20,159	18,936	0	4,845	0	0
SL International (1), Mondul Kiri	0	0	53,705	77,061	0	0
SL International (1), Kratie	34,904	38,923	84,711	0	0	0
SL International (2)	0	0	0	6,810	0	0
Mieng Ly Heng	0	32,492	0	18,712	18,457	6,045
Pheapimex Fuchang (1)	0	15,291	0	39,539	16,406	14,412
Pheapimex Fuchang (1)	0	0	0	11,291	8,210	7,906
Pheapimex Fuchang (2)	0	0	0	12,307	4,518	3,026
Pheapimex Fuchang (3)	0	0	0	0	0	2,508
King Wood	0	0	2,098	20,178	9,361	0

Cherndar Plywood	0	0	0	11,081	24,714	22,651
Sam Rong Wood	0	0	0	0	3,961	10,795
Everbright	0	0	0	11,639	28,672	0
Super Wood	0	0	0	8,802	0	0
Timas Resources	0	0	0	0	0	16,572
Silveroad Wood (1), Mondul Seima	-	-	0	0	0	2,544
Silveroad Wood (2), Thmor Bang	-	-	0	0	0	3,569
You Rysaco	-	-	0	0	2,778	0
TPP	-	-	0	0	0	3,815
Lang Song (1)	-	0	0	0	-	-
Lang Song (2)	-	0	15,038	4,743	0	-
Long Day	0	19,050	0	1,732	0	-
Talam Resources	0	0	0	0	0	0
GAT (1), Koh Kong	30,688	34,412	7,231	3,733	0	0
GAT (2), Kg Thom	0	24,383	22,659	14,716	29,782	8,620
Hero Taiwan	-	-	0	2,493	1,233	1,678
Wood Tee Peanich	-	-	0	0	2,940	0
Double ACE (Koh Kong)	0	0	0	-	-	-
Total	136,026	242,463	233,348	290,876	179,330	121,497

11.3 Analysis and processing of national data

11.3.1 Calibration

This step is not necessary

11.3.2 Estimation and forecasting

A. Industrial Roundwood

The national data is insufficient and does not have simple trend to develop five year averages of removals in 1990 and 2005 and linear interpolation . Therefore regression (Regression Removal = 11878453.6 -5843.31*year) has been used to estimate following figures for average annual removal in 1990 and 2000.

1990   - 250267 cubic meters
2000   - 191834 cubic meters

Figure for 2005 is not being forecasted in view of the logging moratorium on all forest concessions. The timber operations will not be resumed by forest concessionaires unless their forest management plans and ESIA reports satisfy SFM standards.

B. Wood Fuel

The World Bank (1996) is the only document that provides some estimates (1990 to 1996) of fuelwood removal. It estimated that about 3 million cubic meter of fuelwood is extracted annually. Therefore, 3 million cubic meter of fuelwood removal is being assumed for 1990 and 2000. No forecast is being made for 2005.

11.4 Reclassification into FRA 2005 classes

This step is not necessary.

11.5 Data for National reporting table T11

FRA 2005 Categories	Volume in 1000 cubic meters of round wood over bark					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Industrial round wood	250	192	n.a.	N/A	N/A	N/A
Woodfuel	3000	3000	n.a.	N/A	N/A	N/A
TOTAL for Country	**3250**	**3192**	**n.a.**			

11.6 Comments to National reporting table T11

Figure for 2005 is not being forecasted in view of the logging moratorium on all forest concessions since 2001. The timber operations will not be resumed by forest concessionaires unless their forest management plans and ESIA reports satisfy SFM standards

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)
KKH. 2002 Cambodia: Forestry Statistics to 2002. Kingdom of Cambodia.	M	Value of Removal	2002
World Bank. 1996. Cambodia Forest Policy Assessment	H	Value of Removal	1996
KKH. 2004. National Report to the Fifth Session of the United Nations Forum on Forests. Kingdom of Cambodia.	H	Value of Removal	2004

12.2.2 Classification and definitions

No national classification and definitions are available for this Table

12.2.3 Original data

The World Bank (1996) estimates that excluding transportation and logging the stumpage vale should be around $74/m^3$ (Table 3.1 in World Bank report) where as actual royalty is $14/ m^3$. Therefore, this table utilises $14/ m^3$ as the value of round wood in forest.

12.3 Analysis and processing of national data

12.3.1 Calibration

This step is not necessary

12.3.2 Estimation and forecasting

The value of removal mentioned in Table 11 has been calculated using value the royalty rate of $14/ m^3$ for 1990 and 2000.

12.4 Reclassification into FRA 2005 classes

This step is not considered 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	3500	2688	n.a.	n.a.	n.a.	n.a.
Woodfuel	42000	42000	n.a.	n.a.	n.a.	n.a.
TOTAL for Country	**45500**	**44688**	n.a.	n.a.	n.a.	n.a.

12.6 Comments to National reporting table T12

Figure for 2005 is not being forecasted in view of the logging moratorium on all forest concessions since 2001. The timber operations will not be resumed by forest concessionaires unless their forest management plans and ESIA reports satisfy SFM standards

13 Table T13 – Non-wood forest product 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

Data for this table is drawn from Ministry of Agriculture, Forestry and Fisheries (www.maff.gov.kh/statistics/**rubber**.html)

13.2.2 Classification and definitions

There are no national classes or definitions available for this Table.

13.2.3 Original data

Only following data is available on rubber (dried rubber production)

Year	Dry Rubber Yield (ton)	Price (USD)	Total (USD)
1990	34700	N/A	
1991	35000	N/A	
1992	28364	N/A	
1993	22345	N/A	
1994	30585	N/A	
1995	35427	N/A	
1996	43891	900	39501900
1997	43503	947	41197341
1998	41398	658	27239884
1999	44043	480	21140640
2000	42007	530	22263710

2001	38492	460	17706320
2002	32365	605	19580825
2003	32383	672	21761376

13.3 Analysis and processing of national data

13.3.1 Calibration

This step is not necessary

13.3. 2 Estimation and forecasting

A. Data for 1990

Since figure for 1988 and 1989 are not available. The figure (32688 tonnes) for average removal in 1990 has been derived by averaging figures of 1990, 1991 and 1992. The figure (39661 tonnes) for average removal in 2000 has been derived by averaging figures of 1998, 1999, 2000, 2001 and 2002. This figure of 2000 has been assumed for 2005 also.

13.4 Reclassification into FRA 2005 classes

This step is not needed

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			n.a.	n.a.	n.a.
2. Fodder			n.a.	n.a.	n.a.
3. Raw material for medicine and aromatic products			n.a.	n.a.	n.a.
4. Raw material for colorants and dyes			n.a.	n.a.	n.a.
5. Raw material for utensils, handicrafts & construction			n.a.	n.a.	n.a.
6. Ornamental plants			n.a.	n.a.	n.a.
7. Exudates (rubber)		Ton	32688	39661	39661
8. Other plant products			n.a.	n.a.	n.a.
Animal products / raw material					
9. Living animals			n.a.	n.a.	n.a.
10. Hides, skins and trophies			n.a.	n.a.	n.a.
11. Wild honey and bee-wax			n.a.	n.a.	n.a.
12. Bush meat			n.a.	n.a.	n.a.
13. Raw material for medicine			n.a.	n.a.	n.a.
14. Raw material for colorants			n.a.	n.a.	n.a.
15. Other edible animal products			n.a.	n.a.	n.a.
16. Other non-edible animal products			n.a.	n.a.	n.a.

13.6 Comments to National reporting table T13

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

Data for this table is drawn from Ministry of Agriculture, Forestry and Fisheries (www.maff.gov.kh/statistics/**rubber**.html)

14.2.2 Classification and definitions

There are no national classes or definitions available for this Table.

14.2.3 Original data

Only following data is available on rubber (dried rubber production)

Year	Dry Rubber Yield (ton)	Price (USD)	Total (USD)
1990	34700	N/A	
1991	35000	N/A	
1992	28364	N/A	
1993	22345	N/A	
1994	30585	N/A	
1995	35427	N/A	
1996	43891	900	39501900
1997	43503	947	41197341
1998	41398	658	27239884
1999	44043	480	21140640
2000	42007	530	22263710

2001	38492	460	17706320
2002	32365	605	19580825
2003	32383	672	21761376

14.3 Analysis and processing of national data

14.3.1 Calibration

This step is not necessary

14.3. 2 Estimation and forecasting

A. Average price

The data is not available to calculate average price for 1990 and is insufficient to forecast for 2005. Therefore weighted average price ($544/ton) for 2000 has been assumed for 1990 and 2005 also.

14.4 Reclassification into FRA 2005 classes

This step is not necessary

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	n.a.	n.a.	n.a.
2. Fodder	n.a.	n.a.	n.a.
3. Raw material for medicine and aromatic products	n.a.	n.a.	n.a.
4. Raw material for colorants and dyes	n.a.	n.a.	n.a.
5. Raw material for utensils, handicrafts & construction	n.a.	n.a.	n.a.
6. Ornamental plants	n.a.	n.a.	n.a.
7. Exudates	17782	21586	21586
8. Other plant products (rubber resin)	n.a.	n.a.	n.a.
Animal products / raw material			
9. Living animals	n.a.	n.a.	n.a.
10. Hides, skins and trophies	n.a.	n.a.	n.a.
11. Wild honey and bee-wax	n.a.	n.a.	n.a.
12. Bush meat	n.a.	n.a.	n.a.
13. Raw material for medicine	n.a.	n.a.	n.a.
14. Raw material for colorants	n.a.	n.a.	n.a.
15. Other edible animal products	n.a.	n.a.	n.a.
16. Other non-edible animal products	n.a.	n.a.	n.a.
TOTAL	17782	21586	21586

14.6 Comments to National reporting table T14

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)
KKH. 2002. Cambodia: Forestry Statistics to 2002	M		2002
KKH. 2004. Ministry of Agriculture, Forestry and Fisheries (www.maff.gov.kh)	M		2004

15.2.2 Classification and definitions

.There is no information on national classification and definitions relating to this table.

15.2.3 Original data

A. Employees in Forestry Administration

Number of Employees in Department of Forest and Wildlife					
1997	**1998**	**1999**	**2000**	**2001**	**2002**
696	722	748	752	745	858

In addition to this there are employees in Provincial Forest Offices. However, the number (993) of such employees is available only for 2002.

B. Employees in General Department of Rubber

Primary employment in rubber production			
Year	Production Employee	Service Employee	Total
1996	17220	471	17691
1997	17389	413	17802
1998	16588	354	16942
1999	14949	231	15180
2000	14823	226	15049

2001	14816	301	15117
2002	14422	299	14721
2003	13945	509	14454

15.3 Analysis and processing of national data

15.3.1 Calibration

This step is not necessary.

15.3.2 Estimation and forecasting

It is assumed that

(a) number of employees in provincial forest offices in 1990 and 2000 same as in 2002.

(b) number of employees in department of forest and wildlife in 1990 same as in 1997.

(c) number of employees looking after national parks etc. (conservation of biodiversity) is in proportion of the forest areas under conservation of biodiversity (Table 3) and it is roughly 25%. Further that this number represents employment through services.

(d) number of employees in production and service relating to rubber production is counted against production. The number in 1990 is same as in 1996.

15.4 Reclassification into FRA 2005 classes

15.5 Data for National reporting table T15

FRA 2005 Categories	Employment (1000 person-years)	
	1990	**2000**
Primary production of goods	18.96	16.36
Provision of services	0.42	0.44
Unspecified forestry activities		
TOTAL	**19.38**	**16.80**

15.6 Comments to National reporting table T15