Forestry Department
Food and Agriculture Organization of the United Nations

GLOBAL FOREST RESOURCES ASSESSMENT

COUNTRY REPORTS

LAO PDR

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The Forest Resources Assessment Programme

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

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

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

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1 Table T1 – Extent of 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)
DOF. 2002. Forest cover assessment 2002. Department of Forestry. National Office of Forest Inventory and Planning. Lao PDR.	M	Extent	2002
MAF. 1992. Forest cover and Land use in Lao PDR-Final Report on the Nationwide Reconnaissance Survey. Ministry of Agriculture and Forestry. Department of Forestry. National Office of Forest Inventory and Planning. Lao PDR.	L	Extent	1982 & 1989
DOF. 2000. NFI Database. Department of Forestry. National Office of Forest Inventory and Planning. Lao PDR.	L	Extent	1990

1.2.2 Classification and definitions

National class	Definition
1. Current Forest CF	
Dry Dipterocarp	The Dry Dipterocarp Forest occurs in open stands. The tree diameter is comparably small and the height of the stand varies from 8 to 25 m. The crowns do not spread out widely. This type of forest is normally found in places with shallow soil, where the hard pan emerges above the ground, and on latirized soil. On the most poor and shallow soils the trees are crooked and do not exceed 10 m in height: If the crown cover is less than 20 % and the stand is undisturbed the vegetation type should be classified as Savannah.
Upper Dry Evergreen and Lower Dry Evergreen	The evergreen forest type is a multi-storey forest consisting of more than 80% trees of evergreen species. Most of the trees have long and cylindrical boles, many of them with a big buttress. Usually, the height of the trees of the upper storey is more than 30 m. Another typical characteristic of this forest type are climbers and lichen on the tree stems. Bamboo is usually not

	found except when the canopy has been opened. Evergreen forest located at an altitude above 200 m is classified as Upper Evergreen Forest. Areas below that altitude are classified as Lower Evergreen Forest.
Upper Mixed Deciduous and Lower Mixed Deciduous	Mixed deciduous forest type the deciduous tree species represent more than 50% of the stand. The forest storeys are not as dense as those of evergreen type. Most often bamboo occurs in this type of forest. Mixed deciduous forest located at an altitude above 200 m is classified as Upper Mixed deciduous Forest. Mixed deciduous forest located at an altitude 200 m and below is classified as Lower Mixed Deciduous Forest.
Gallery Forest	The Gallery Forest is not characterized by tree species composition but could be i.e. either deciduous or evergreen. Clues used for identification of this forest type are the occurrence of some other land use types in its vicinity such as streams and villages. In areas where streams are likely to overflow seriously, the forest is often left along the low bank of the streams (both persistent and intermittent ones) forming a long band of forest with the stream bed on one side and, for, example, paddy fields on the other. The width of the Gallery Forest will not be more than 100 m.
Coniferous	The Coniferous Forest is usually single storied and open but the young growth may sometimes form a dense second storey. This forest type occurs in higher elevations with a cool climate. The charaderistic species of this type are pines but (Pinus kesiya or Pinus merkusii) but other coniferous trees such as i.e. Cunninghammia may also be predominant.
Mixed Coniferous and Broadleaved	The Mixed Coniferous Forest is a transition type between the coniferous and the broadleaved forest types. The coniferous trees could be mixed with either deciduous or evergreen trees. It is also found in higher elevations.
Wood Plantation	In Forest Plantations the planted trees could still be identified (i.e. by even height, even spacing or by species typical for plantations) although they may be mixed up with other non-cultivated plants. All sustainable plantations (including young ones with a crown density less than 20 % should be classified as Forest Plantations. Rubber plantations are also classified as Forest Plantations. Coffee, tea and shade providing trees for coffee and tea as well as fruit trees are not classified as Forest Plantations.
2. Potential Forest Area	
Bamboo (B)	If an area is covered with bamboo and the over storey has a crown cover less than 5% it should be classified as Bamboo. Abandoned ray is often recovered by bamboo. Some species of bamboo may last for many years. Bamboo brakes may vary in height from 2 m to 25 m depending on their species. If the Bamboo represents less than 80% of the total vegetation cover of the under storey I the vegetation type should not be classified as Bamboo.
Temporally Unstocked (T)	Unstocked Forest Areas are previously forested areas in which the crown density has been reduced to less than 20 % because of logging, shifting cultivation or other heavy disturbance. If the area is left to grow undisturbed it becomes forest again. Abandoned ray and disturbed stands with a crown density less than 20% should be classified as Unstocked Forest Areas. Old ray in which seedlings, sapling~ and trees cover more than 20% of the area should be classified as some type of Current Forest.
Ray (RA)	Ray is an area where the forest has been cut and burnt for temporary cultivation of rice and other crops. The area should be classified as Ray from the time of clearcut until one year after it has been abandoned. Areas being prepared for clearcut but not yet clearcut and areas that have been

	abandoned for more than 1 year should not be classified as Ray.
3. Other wooded area (OW)	
Savannah/open wood land	The Savannah is an area where the soil conditions are unsuitable for tree growth as well as agriculture production. The tree cover in the Savannah should be at least 1% but not more than 20%. The trees are drought resistant and mostly short with graminaceous and herbaceous plants forming an understorey. Savannahs should not be mixed up with those grass covered areas that sometimes occur after shifting cultivation. Normally, the Savannah does not occur on steep slopes but in plain areas.
Heath, Scrub Forest	This is an area covered with scrub and stunted trees. The soil is shallow and rocky.
4. Permanent Agriculture Land (PA)	
Rice Paddy	Areas permanently being used for rice cultivation. Old paddy that has been abandoned and not. been in use for more than one year should not be classified as Rice Paddy.
Agriculture Plantation	Areas of agricultural land being used for production of other crops than rice, i.e. various kinds of vegetables, for fruit tree cultivation etc. Plantations with cash crops, such as coffee, tea, cocoa and cotton are also referred to this land use class.
Other Agriculture Land	Agricultural land being used for other agricultural purposes than agricultural crop cultivation, i.e. grazing of cattle, should be classified as Other Agricultural Land, unless the tree cover exceeds 20%. In that case it should be classified as some type of Current Forest depending on the tree species composition.
5. Other Non- Forest Area	
Barren land, Rock (R)	Unfertile or seriously degraded land on shallow soil and rocky areas on which neither trees nor grasses can grow.
Grassland (G)	Unfertile or degraded land on which no trees or shrubs grow. t might be an area that is too dry for tree growth that has been covered by grasses. It could also be an area that has originally been covered by trees which has been heavily disturbed by cutting and fire and gradually depleted. One reason for the absence of trees could be that of big areas have been deforested that the seed supply from surrounding forest has ceased. Areas being burnt over and over again (every year) for production of fodder I for hunting purposes etc. could also be classified as Grassland. That type of Grassland could be found on higher elevations in the Northern part of Laos. Grassland could also occur on deep sand with high moisture content.
Urban area (U)	Urban Areas include all areas being used for permanent settlements such as villages, towns, public gardens etc. It also includes roads having a width of more than 5 m and areas under electric high power lines. Any type of land under high power lines, except Rice Paddy, should be classified as Urban Areas.
Swamps (SW)	Swamps are areas where the soil is saturated with water. The soil may basically be fertile but the lack of oxygen limits its agriculture or forest-production capacity. The Swamp could have a high ecological or environmental value and the flora and fauna may be rich. The typical tree species found in the Swamps are trees which can grow in water, i.e. Adina cordifolia, Rhus succedanea and Barringtonia acutangula.

Water (W)	The land use class Water includes rivers, water reservoirs (i.e. ponds and dams for irrigation and hydro power) and lakes. Water reservoirs and lakes should have an area of 0.5 ha and rivers should be at least 10m wide to be classified as Water. In other cases it should be joined to adjacent land use class.

Mapping a National class into a FRA 2005 classes

FRA 2005 Categories	**National classes (percentage of a national class that belongs to a FRA class)**										
	CF	B	RA	OW	T	PA	G	R	U	W	SW
Forest	100	100			60						
Other wooded land				100	40						
Other land			100			100	100	100	100		
...of which with tree cover [1)]											
Inland water bodies										100	100

1.2.3 Original data

A. Data for 1982

FRA 2005 Classes	**National Landuse Class**	**Area (000 ha)**
Forests	Dry Dipterocarp	1235
	Lower Dry Evergreen	89
	Upper Dry Evergreen	1106
	Lower Mixed Deciduous	893
	Upper Mixed Deciduous	7793
	Gallery Forest	91
	Coniferous	138
	Mixed Coniferous / Broadleaved	293
	Bamboo	1457
	Temporarily unstocked	3912
	Sub Total	**17007**
Other wooded Land		
	Rest Temporarily Unstocked Forest	2608
	Savannah / Open Woodlands	974
	Heath, Scrub Forest	572
	Sub Total	**4154**
Other land	Ray	598
	Rice Paddy	658
	Agriculture Plantation	15
	Other Agriculture Land	35
	Barren Lands/ Rock	110
	Grassland	804
	Urban Areas	82
	Swamps	34
	Water	204
	Sub Total	**2541**
	TOTAL	**23702**

(About 60 percent of the "Unstocked forest land" has been apportioned to "Temporary Unstocked Forest land as part of Forests and the rest to other wooded lands)

B. Data for 1990

The National Forest Inventory started in1991. The NFI data base provide following information to FRA 2000 pertaining to NFI in its provinces. The complied data provides province-wise areas only by Natural High Forest (NHF), Dry Dipterocarp Forest (DDF) and Potential Forest (PF). The NFI used satellite images of following years in different provinces during its implementation.

Province	Year of satellite images	Province	Date of satellite images
01	1986, 1987, 1988, 1989, 1990	10	NA
02	1987, 1990	11	1986, 1987, 1988, 1989
03	1989, 1990	12	1987, 1988, 1989, 1990, 1992
04	NA	13	1992, 1993
05	1989, 1990	14	1992, 1993
06	1987, 1988, 1989, 1990	15	1991, 1992, 1994
07	1987,1988, 1990, 1991	16	1988, 1989, 1990, 1991
08	1987, 1988, 1989, 1990	17	1988, 1991, 1992
09	1987, 1988, 1989, 1990, 1991		

The reference year for this NFI has been taken as 1990 for this report as the years span from 1986 to 1994 and because the year 1990 is most common year among the provinces.

FRA 2005 Class	National Classes of Landuse	Area (000 ha)
Forest		
	NHF with CD > 70% (accessible areas)	310
	NHF with CD 40 - 69% (accessible areas)	1020
	NHF with CD 20 - 39% (accessible areas)	508
	NHF in inaccessible areas	8288
	DDF with CD > 70%	16
	DDF with CD 40 - 69%	597
	DDF with CD 20 - 39%	789
	DDF in inaccessible areas	200
	Bamboo*	1612
	Temporary stocked forest land	3977
	Sub Total Forest	**17314**
Other Wooded land		
	Rest Unstocked forest land	2651
	Ray*	598
	Other woodland (Shrub+Scrub)	224
	Sub-Total Other Wooded Land	**3472**
Other Land		
	Agriculture land	1184
	Other land	1710
	Sub Total Other land	**2894**
TOTAL	**TOTAL Area**	**23680**

(Note: 1. Area under Bamboo has been derived with the help of 1989 information in MOF (1992) and that of Ray from 1990 information. 2. An area of 3660 ha of Dipterocarp has been deducted from original figures due to data discrepancies in Province No. 06 and 16.)

C. Data for 2002

The following data from Forest Cover Assessment 2002 was presented by the country at the National Correspondent meeting in Bangkok in November 2004. The breakdown of this information by national land use classes is not available. Area of Ray (598,000 ha as in 1990) has been included with "Other land".

FRA 2005 Categories	Area in 000 ha
Forest	16376
Other Wooded lands	4289
Other Land	2415
Inland water bodies	600
Total	23680

1.3 Analysis and processing of national data

The national information for 1990 and 2002 are the main sources of information for this table.

1.3.1 Calibration

This step has been implemented because the national statistics on the area of inland water bodies for 1990 does not match with area reported (600,000 ha) in FAOSTAT. All adjustments during calibration have been made in the area of "other land".

FRA 2005 Classes	1990	2002
Forest	17314	16974
Other Wooded Land	3472	3691
Other land	2294	2415
Inland water bodies	600	600
Total Country Area	23680	23680

1.3.2 Estimation and forecasting

The estimates for 2000 and 2005 have been developed through linear interpolation and extrapolations.

FRA Categories	Area (1000 hectares)		
	1990	2000	2005
Forest	17314	16532	16142
Other wooded land	2875	4053	4643
Other land	2891	2495	2295
...of which with tree cover [1)]	n.a.	n.a.	n.a.
Inland water bodies	600	600	600
TOTAL	**23680**	**23680**	**23680**

1.4 Reclassification into FRA 2005 classes

The reclassification has already been done while presenting the original data. It is presented for consistency and uniformity among country reports.

National Class	**Percentage of a national class that matches with a FRA Class**				
	Forest	**OWL**	**Other land**	**OWLT**	**Inland water bodies**
Current forests	100				
Bamboo	100				
Ray			100		
Temporarily un-stocked	60	40			
Other Wooded Area		100			
Permanent Agriculture			100		
Grassland			100		
Barren Rock			100		
Urban Area			100		
Swamp					100
Water					100

1.5 Data for National reporting table T1

FRA 2005 Categories	**Area (1000 hectares)**		
	1990	**2000**	**2005**
Forest	17314	16532	16142
Other wooded land	2875	4053	4643
Other land	2891	2495	2295
...of which with tree cover [1)]	n.a.	n.a.	n.a.
Inland water bodies	600	600	600
TOTAL	**23680**	**23680**	**23680**

1) Area of "Other land with tree cover" is included in the area reported under "Other land" and should therefore be excluded when calculating the total area for the country.

1.6 Comments to National reporting table T1

1. The data compilation differs from national statistics in the sense that forests under FRA 2005 includes "Potential Forest" areas.
2. The data compilation differs from FRA 2000 in the sense that sixty percent of the "unstocked forest areas" have been apportioned to "forest" area.

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

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)
Land law. LAO PDR	H	Ownership	2003
Forest Law. LAO PDR	H	Ownership	1996
Southavilay, Thongleua and Tuukka Castrén. 1998. Timber Trade And Wood Flow Study - Lao PDR. Regional Environmental Technical Assistance 5771. Poverty Reduction & Environmental Management in Remote Greater Mekong Subregion (GMS) Watersheds Project (Phase I). LAO PDR.	M	Ownership	1993 to 1998

2.2.2 Classification and definitions

National class	Definition
Public ownership	Natural forests and forest lands are the property of the national community whom the state represents in the administration and allocation of individual use and reasonable organisation. Individuals and organisation shall have the right to possess and use any trees, natural forest and forest land provided only that they have received approval from the relevant authorized agency.

2.2.3 Original data

All "Forest" and "Other Wooded land" in Laos belongs to the state (Forest law (1996), Land Law (2003), and Southavilay and Castrén. 1998).

2.3 Analysis and processing of national data

2.3.1 Calibration

This step is not necessary.

2.3.2 Estimation and forecasting

This step is not necessary.

2.4 Reclassification into FRA 2005 classes

This step is not necessary.

2.5 Data for National reporting table T2

FRA 2005 Categories	Area (1000 hectares)			
	Forest		Other wooded land	
	1990	2000	1990	2000
Private ownership				
Public ownership	17314	16532	2875	4053
Other ownership				
TOTAL	17314	16532	2875	4053

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

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)
Tsechalicha, Xiong and Don Gilmour. 2000. Forest Rehabilitation in LAO PDR- Issues and Constraints. IUCN.	M	Designation	1990
TFAP. 1990. Tropical Forestry Action Plan, First Phase (1990). Government of LAO PDR. Ministry of Agriculture and Forestry, Vientinae.	M	Designation	1990
UNEP-WCMC. 2005. World Database on Protected Areas. (http://sea.unep-wcmc.org/wdbpa/)	H	Conservation Areas	2005
UNEP. 2002. State of Environment 2001- LAO PDR. Bangkok. Thailand (http://www.rrcap.unep.org/reports/soe/laosoe.cfm)	H	Conservation Areas	1993 and 1995
Record at the Department of Forestry.	M	Designation	1990 to 2004

3.2.2 Classification and definitions

National class	Definition
Production Forest	Forests and forest lands which are classified to provide for the requirements of national socio-economic development and peoples' livelihoods in terms of wood and forest derived products which do not seriously affect the environment.

Protection Forest	Forests and forest lands which are classified for the purpose of protecting water sources, preventing soil erosion, strategic areas for national defence, prevention of natural disasters, the environment, etc.
National Biodiversity Conservation Areas (NBCAs)	Forests and forest lands which are classified for the purpose of preventing species of flora and fauna, nature and other precious things in terms of history, culture, tourism, the environment, education, and scientific research.

3.2.3 Original data

A. Data for 1990

The country has over all designated (TFAP, 1990 quoted in Tsechalicha and Don Gilmour, 2000) the forest area in following three categories.

Designation	**Area in 000 ha**
Production Forests	5000
Protection Forests	9500
Conservation Forests	2500
Total	**17000**

B. Data for 1993 and 1995

The SOE (2001) indicates following state of "Biodiversity conservation Areas" in 2001.

Biodiversity Conservation Area	**Year Established**	**Area in 000 ha**
1. Phou Daen Din	1993	222
2. Nam Ha	1993	222
3. Nam Et	1993	170
4. Phou Loei	1993	150
5. Nam Xam	1993	70
6. Nam Phui	1993	191
7. Phou Phanang	1993	70
8. Phou Khao Khouay	1993	200
9. Nam Khading	1993	169
10. Phou Hinpoun	1993	150
11. Nakai Namtheun	1993	353
12. Hin Nam Nor	1993	82
13. Phou Xang He	1993	110
14. Dong Phouvieng	1996	197
15. Xe Sap	1995	137
16. Xe Bang Nouan	1993	150
17. Phou Xiangthong	1993	120
18. Dong Hua Sao	1993	110
19. Dong Ampham	1993	200
20. Xe Pian	1993	240
Total		**3314**

C. Data for 1992 and 2002

The country presented following figures in National Correspondent meeting in Bangkok in November, 2004. However no documentation has been provided to support these figures.

FRA 2005 categories/ Designated function	**Area (1000 hectares)**	
	1992	**2002**
Forest		
Production	3207	3423
Protection of soil& water	10784	8696
Conservation of biodiversity	3391	4826
Social services	18	29
Total Forest	**17400**	**16974**
Other wooded land		
Production	416	429
Protection of soil& water	1664	1716
Conservation of biodiversity	2081	2144
Total Other wooded land	**4161**	**4289**

The social services include spiritual and sacred forests and it has been assumed that in rural area the average of social services forest area is about 3 ha per village.

C. Data for 2005

The UNEP-WCMC (2005) at its website in July 2005 indicates that there are 27 PA in the country and they cover 3,790,431 ha. area.

3.3 Analysis and processing of national data

3.3.1 Calibration

This step is not necessary.

3.3.2 Estimation and forecasting

A. Biodiversity Conservation Area

The figure for 1990 has been taken from TFAP (1990) and the figure for 2000 from UNEP (2002). The figure for 2005 has been taken from UNEP-WCMC (2005) website.

B. Production Areas

The figures presented by the country for 1992 and 2002 in the November 2004 meeting of "National Correspondents" have been used for linear interpolation and extrapolation.

C. Social Service Areas

The figures presented by the country for 1992 and 2002 in the November 2004 meeting of "National Correspondents" have been used for linear interpolation and extrapolation.

D. Protection Area

Following the TFAP (1990) all remaining areas have been apportioned to Protection Areas.

FRA Designation	1990	2000	2005
Forest			
Production	3164	3380	3488
Protection of soil& water	11634	10310	9579
Conservation of biodiversity	2500	3314	3790
Social services	16	27	32
Total Forest	17314	17031	16889
Other wooded land			
Production	413	426	433
Protection of soil& water	991	1098	1150
Conservation of biodiversity	2068	2131	2163
Total Other wooded land	3472	3655	3746

3.4 Reclassification into FRA 2005 classes

A. Area with Primary Function

National Class	Percentage of a National Class to a FRA Classes of Primary Function					
	Production For./OWL	Protection For./OWL	Conservation of Biodiversity	Social Service	Multiple Function	Unknown Function.
	%	%	%	%	%	%
Production	100					
Protection		100				
Conservation			100			
Social Service				100		

B. Total Area with Function

National Class	Percentage of a National Class to FRA Classes of Area with Total Function					
	Production For. / OWL	Protection For./ OWL	Conservation of Biodiversity	Social Service	Multiple Function	Unknown Function.
	%	%	%	%	%	%
Production	100					
Protection		100	100			
Conservation		100	100	100		
Social Service		100		100		

3.5 Data for National reporting table T3

FRA 2005 Categories / Designated function	Area (1000 hectares)					
	Primary function			Total area with function		
	1990	2000	2005	1990	2000	2005
Forest						
Production	3164	3380	3488	3164	3380	3488
Protection of soil and water	11634	9811	8832	14150	13152	12654
Conservation of biodiversity	2500	3314	3790	14134	13125	12622
Social services	16	27	32	2516	3341	3822
Multiple purpose				Not appl.	not appl.	not appl.
No or unknown function				Not appl.	not appl.	not appl.
Total - Forest	**17314**	**16532**	**16142**	**Not appl.**	**not appl.**	**not appl.**
Other wooded land						
Production	413	426	433	413	426	433
Protection of soil and water	394	1496	2047	2462	3627	4210
Conservation of biodiversity	2068	2131	2163	2462	3627	4210
Social services				2068	2131	2163
Multiple purpose				Not appl.	not appl.	not appl.
No or unknown function				Not appl.	not appl.	not appl.
Total – Other wooded land	**2875**	**4053**	**4643**	**Not appl.**	**not appl.**	**not appl.**

3.6 Comments to National reporting table T3

All the protected areas are assumed to be forested.

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)
MAF. 1991. Survey of Plantations in LAO PDR. LAO-Swedish Forestry Co-operation Programme- Forest Inventory. Report No.1. Ministry of Agriculture and Forestry. Department of Forestry and Environment. Forest Inventory and Management Office. LAO PDR	H	Plantations till 1990	1990
Tsechalicha, Xiong and Don Gilmour. 2000. Forest Rehabilitation in LAO PDR- Issues and Constraints. IUCN. LAO PDR.	M	Plantations till 1998	1998

4.2.2 Classification and definitions

There are no national definitions relevant for this table.

4.2.3 Original data

A. Primary Forest

No information is available.

B. Modified Forests

No information is available.

C. Semi-natural forests

No information is available.

D. Plantations

MAF (1991) indicates that area of plantations till 1990 is 2900 ha. Tsechalicha and Gilmour (2000) indicate that 47.589 ha has been brought under plantations (excluding that for watersheds) between 1991 to 1998. They also indicate there is a plan to establish about 25,000 ha. per annum.

Variable	1990	1991 to 1998
Area under Plantations in 000 ha	2.9	47.589

They however do not mention the extent of plantation under various afforestation activities for watershed rehabilitation. A nominal extent of 1,000 ha is being assumed for 1990 and 2000.

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 Forests

There is no information available on the extent of primary forests. It has been assumed that about fifty percent of the forest area (2980, 000 ha) designated to biodiversity conservation in 1993 continues to be the primary forests since 1990.

Variable	1990	2000	2005
Primary Forests in 000 ha	1490	1490	1490

B. Plantations

Figures for 2000 and 2005 of Productive plantations have been estimated by assuming that the plan of planting 25,000 ha per annum has been implemented from 1999 and that it continues till date. Further, a token figure of 1000 ha of protective plantations has been assumed considering the various past and on going activities to rehabilitate watersheds.

Variable	1990	2000	2005
Productive Plantations in 000 ha	2.9	97.6	222.6
Protective Plantations in 000 ha	1.0	1.0	1.0

C. Modified forests

There is no information on extent of modified forests. It has been assumed that the area of forests less area of primary forests and plantations is the areas of modified forests.

Variable	1990	2000	2005
Modified Forests in 000 ha	15820	14943	14428

4.4 Reclassification into FRA 2005 classes

This step is not 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	1490	1490	1490	n.a.	n.a.	n.a.
Modified natural	15820	14943	14428	n.a.	n.a.	n.a.
Semi-natural				n.a.	n.a.	n.a.
Productive plantation	3	98	223	n.a.	n.a.	n.a.
Protective plantation	1	1	1	n.a.	n.a.	n.a.
TOTAL	**17314**	**16532**	**16142**	n.a.	n.a.	n.a.

4.6 Comments to National reporting table T4

There are no national figures for this table. The above data is based on assumptions.

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

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)
MAF. 1992. Forest cover and Land use in Lao PDR-Final Report on the Nationwide Reconnaissance Survey. Ministry of Agriculture and Forestry. Department of Forestry. National Office of Forest Inventory and Planning. Lao PDR.	L	Extent	1982 & 1989
DOF. 2000. NFI Database. Department of Forestry. National Office of Forest Inventory and Planning. Lao PDR.	L	Extent	1992 to 1997

5.2.2 Classification and definitions

No national classification or definitions are available for this table.

5.2.3 Original data

The NFI database provides information on the estimate of growing stock in various provinces. The field work was done 1992 to 1997 and therefore, the reference year may be considered as 1995. Following is the summary table developed to provide estimate for forest and other wooded lands.

A. Summary Table

National Classes of Forests	Area (000 ha)	Volume (000 m^3)	Volume per ha
Natural High Forests (NHF)	10125.24	891811.18	88.08
Dry Dipterocarp Forests (DDF)	1603.96	81154.75	50.60
Potential Forests (PF)	8836.84	60743.82	6.87
Total Forest (NHF+DDF+0.6*PF)	17031	1009412	59.27
Total OWL (0.4*PF)	3535	24298	6.87

B. Detailed Table

Province	Forest type	Area (000 ha)	Avg. vol (m^3/ha)	Total volume (000 m^3)	Field work (Year)
1	NHF	133.59	108.81	14,535.93	1992
	DD	28.36	24.94	707.3	
	PF	66.31	6.45	427.7	
2	NHF	718	64.57	46,361.26	1997
	DD	0	0	0	
	PF	674	6.93	4,670.82	
3	NHF	464.42	58.07	26,968.87	1997
	DD	0	0	0	
	PF	332.95	7.77	2,587.02	
4	NHF	488	43.22	21,091.36	1997
	DD	0.93	NA		
	PF	1019	1.47	1,497.93	
5	NHF	272.6	54.74	14,922.12	1997
	DD	0	0	0	
	PF	198.67	5.9	1,172.15	
6	NHF	347.35	19.29	6,700.38	1995
	DD	16.94	21.62	366.24	
	PF	1475.34	0.93	1,372.07	
7	NHF	732.38	55.48	40,632.44	1998
	DD	0	0	0	
	PF	742.47	7.59	5,635.35	
8	NHF	704.71	111.01	78,229.86	1993
	DD	157.56	82.48	12,995.55	
	PF	696.2	7.87	5,479.09	
9	NHF	734.84	38.99	28,651.41	1998
	DD	6.33	0	0	
	PF	524.55	3.3	1,731.02	
10	NHF	648.44	56.6	36,701.70	1993
	DD	0	0	0	
	PF	1069.8	11	11,767.80	
11	NHF	1139.1	66.48	75,727.37	1996
	DD	11.6	62.93	729.99	
	PF	343.4	14.67	5,037.68	
12	NHF	956.5	188.23	180,042.00	1992
	DD	46.1	62.19	2,866.96	
	PF	232.5	26.08	6,063.60	
13	NHF	698.7	96.96	67,745.95	1992
	DD	600.1	58.82	35,297.88	
	PF	436.1	9.04	3,942.34	
14	NHF	529.4	152.64	80,807.62	1990
	DD	146.3	49.82	7,288.67	
	PF	253.9	15.28	3,879.59	
15	NHF	405.71	105.41	42,765.89	1994
	DD	61.44	46.68	2,868.02	
	PF	387.45	9.49	3,676.90	
16	NHF	526.1	99.76	52,483.74	1994
	DD	320.3	39.66	12,703.10	
	PF	184.7	5.98	1,104.51	
17	NHF	625.4	123.83	77,443.28	1995
	DD	208	25.63	5,331.04	
	PF	199.5	3.5	698.25	
Total		**20.566.1**		**1,033,709.74**	

5.3 Analysis and processing of national data

5.3.1 Calibration

This step is not necessary.

5.3.2 Estimation and forecasting

Since there is single set of information available on the growing stock and that too spans the years 1992 to 1997, hence the volume per hectare figures from this information will be used for 1990, 2000 and 2005 estimations of growing stock. The commercial growing stock has been assumed to be around 74% based on the information presented by the country in November 2004 in Bangkok meeting of National Correspondent of FRA 2005.

Variables	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Area in 000ha	**17314**	**16532**	**16142**	**2875**	**4053**	**4643**
Volume per ha (m3/ha)	**59.27**	**59.27**	**59.27**	**6.87**	**6.87**	**6.87**
Growing stock in million m3	1026	980	957	20	28	32
Commercial growing stock in million m3	759	725	708	15	21	24

5.4 Reclassification into FRA 2005 classes

This step is not needed.

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	1026	980	957	20	28	32
Commercial growing stock	759	725	708	15	21	24

Specification of country threshold values	Unit	Value	Complementary information
1. Minimum diameter at breast height of trees included in Growing stock (X)	cm	n.a.	
2. Minimum diameter at the top end of stem (Y) for calculation of Growing stock	cm	n.a.	
3. Minimum diameter of branches included in Growing stock (W)	cm	n.a.	
4. Minimum diameter at breast height of trees in Commercial growing stock (Z)	20 cm	n.a.	
5. Volume refers to “Above ground” (AG) or “Above stump” (AS)	AG / AS	n.a.	
6. Have any of the above thresholds (points 1 to 4) changed since 1990	Yes/No	n.a.	
7. If yes, then attach a separate note giving details of the change	Attachment	n.a.	

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

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

6.2.2 Classification and definitions

No national classification or definitions relevant to this table are available.

6.2.3 Original data

Information from Table 5 has been used in this table along with the default factors from GPG (2003).

An average basic density 0.6 has been assumed based on information in GPG (2003).

6.3 Analysis and processing of national data

6.3.1 Calibration

This step is not necessary

6.3.2 Estimation and forecasting

A. Stem biomass

Stem biomass has been calculated by multiplying the above growing stock in Table 5 with the "average wood density" of 0.6.

Variables	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Total Growing Stock (million m3)	1026	980	957	20	28	32
Assumed Density	0.6	0.6	0.6	0.6	0.6	0.6
Stem biomass (million tonnes)	616	588	574	12	17	19
Area Table 1	17314	16532	16142	2875	4053	4643
Per hectare Stem Biomass	35.56	35.56	35.56	4.12	4.12	4.12

B. Biomass Expansion Factor

The BEFs has been calculated by using following formula of Sandra Brown (1997).

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

It provides a BEF value of 4.08 for forest areas but a very high BEF value (more than 12) for "Other Wooded lands". The BEF of 4.08 has been considered as appropriate and adopted for both "Forests" and "OWL" and for all the three reference years.

C. Above Ground Biomass

The following estimates of "Above Ground Biomass" have been developed by using the figures of stem biomass and BEF.

Variable	Unit	Forest			Other wooded land		
		1990	2000	2005	1990	2000	2005
Stem biomass	Million tonnes	616	588	574	12	17	19
BEF		4.08	4.08	4.08	4.08	4.08	4.08
Above Ground Biomass	Million tonnes	2512	2399	2342	48	68	78

D. Below Ground Biomass

A default value of 0.27 for the Root to Shoot ratio (ratio of below ground bio-mass and above ground biomass) has been adopted from GPG (2003).

Variable	Unit	Forest			Other wooded land		
		1990	2000	2005	1990	2000	2005
Above Ground Biomass	Million tonnes	2512	2399	2342	48	68	78
Root to shoot ratio		0.27	0.27	0.27	0.27	0.27	0.27
Below Ground Biomass	Million tonnes	678	648	632	13	18	21

E. Deadwood Biomass

It has been calculated by adopting a default value of 0.11 for dead to total live biomass (total of above and below ground biomass) ratio from GPG (2003).

Variable	Unit	Forest			Other wooded land		
		1990	2000	2005	1990	2000	2005
Total Live Biomass	Million tonnes	3190	3047	2974	61	86	99
Dead to live ratio		0.11	0.11	0.11	0.11	0.11	0.11
Dead Wood Biomass	Million tonnes	351	335	327	7	10	11

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	2512	2399	2342	48	68	78
Below-ground biomass	678	648	632	13	18	21
Dead wood biomass	351	335	327	7	10	11
TOTAL	3541	3382	3301	68	96	110

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

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)
GPG, 2003. Good Practise Guidance for Land-use, Land-use Change and Forestry. IPCC.	H	Basic Densities, Root: Shoot Ratio, Dead to Live Ration	All

7.2.2 Classification and definitions

No national classification or definitions relevant to this table are available.

7.2.3 Original data

Information from Table 6 along with the default value (GPG, 2003) for carbon density of 0.5 has been used for this table.

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 biomass

The carbon in living (above and below ground) biomass in 1990, 2000 and 2005 was calculated by using the biomass figures from the National Reporting Table 6 using the GPG (2003) default factor of 0.5.

Variables	Units	Forest			Other wooded land		
		1990	2000	2005	1990	2000	2005
Carbon in Above Ground Biomass	million tonnes	1256	1199	1171	24	34	39
Carbon in Below Ground Biomass	million tonnes	339	324	316	7	9	11

B. Carbon in Deadwood biomass

It has been calculated by using the respective figures in Table T 6 and the GPG default factor.

Variables	Units	Forest			Other wooded land		
		1990	2000	2005	1990	2000	2005
Carbon in Dead Wood Biomass	million tonnes	175	168	164	3	5	5

C. Carbon in litter

It has been calculated by using default value of 2.1 for tropical forest in GPG (2003).

Variables	Units	Forest			Other wooded land		
		1990	2000	2005	1990	2000	2005
Forest Area Table1	000 ha	17314	16532	16142	2875	4053	4643
Carbon in forest litter/ha	tonnes/ha	2.1	2.1	2.1	2.1	2.1	2.1
Carbon in Forest Litter	million tonnes	36	35	34	6	9	10

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	1256	1199	1171	24	34	39
Carbon in below-ground biomass	339	324	316	7	9	11
Sub-total: Carbon in living biomass	**1595**	**1523**	**1487**	**31**	**43**	**50**
Carbon in dead wood	175	168	164	3	5	5
Carbon in litter	36	35	34	6	9	10
Sub-total: Carbon in dead wood and litter	**211**	**203**	**198**	**9**	**14**	**15**
Soil carbon to a depth of _____ cm						
TOTAL CARBON	**1806**	**1726**	**1685**	**40**	**57**	**65**

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)
IUCN. 2002. Framing Fires: A country-by country analysis of forest and land fires in the ASEAN nations. Dr. David Ganz. Project FireFight South East Asia. 2002 Project Fire Fight South East Asia. Jakarta, Indonesia (http://www.pffsea.org).	M	Fire Damage	

8.2.2 Classification and definitions

No national classification or definitions relevant to this table are available.

8.2.3 Original data

Currently, there is no data available on disturbances affecting forest health and vitality. The statistics kept on shifting cultivation estimates yearly an average of more than 100,000 hectares of forest are burnt. However, it may be mentioned that this statistics does not differentiate between wanted and unwanted fires.

8.3 Analysis and processing of national data

8.3.1 Calibration

This step is not necessary.

8.3.2 Estimation and forecasting

This step is not necessary.

8.4 Reclassification into FRA 2005 classes

This step is not necessary.

8.5 Data for National reporting table T8

FRA-2005 Categories	Average annual area affected (1000 hectares)			
	Forests		Other wooded land	
	1990	2000	1990	2000
Disturbance by fire	100	100	n.a.	n.a.
Disturbance by insects	n.a.	n.a.	n.a.	n.a.
Disturbance by diseases	n.a.	n.a.	n.a.	n.a.
Other disturbance	n.a.	n.a.	n.a.	n.a.

8.6 Comments to National reporting table T8

Currently, there is no data available on disturbances affecting forest health and vitality. The statistics kept on shifting cultivation estimates yearly an average of more than 100,000 hectares of forest are burnt. However, it may be mentioned that this statistics does not differentiate between wanted and unwanted fires.

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)
UNEP. 2002. State of Environment 2001- LAO PDR. Bangkok. Thailand (http://www.rrcap.unep.org/reports/soe/laosoe.cfm)	H	Endemic plant species	
IUCN. 2004. Red List of Threatened Species. Gland, Switzerland: The World Conservation Union.	H	Threatened species	2004

9.2.2 Classification and definitions

No national information is available.

9.2.3 Original data

A. Native species

No national information is available on number of native tree species in Laos. The UNEP (2002) informs that there are 1457 endemic plant species. It does not indicate how many of these are the forest tree species.

B. Threatened Tree Species.

No national information is available on number of threatened forest tree species. The website of the IUCN RED List of Threatened Species 2004 provides following information on critically endangered species, endangered species, and vulnerable species. It also does not indicate as to how many of these are tree species.

Critically Endangered -5

1 *Aquilaria crassna*
2 *Diospyros mun*
3 *Dipterocarpus turbinatus*
4 *Hopea thorelii*
5 *Shorea thorelii*

Endangered Species – 7

1 *Afzelia xylocarpa*
2 *Dalbergia bariensis*
3 *Dipterocarpus costatus*
4 *Hopea pierrei*
5 *Hopea recopei*
6 *Shorea henryana*
7 *Shorea roxburghii*

Vulnerable species – 8

1 *Cunninghamia konishii*
2 *Cycas pectinata*
3 *Cycas sp. nov. 'collina'*
4 *Dalbergia cochinchinensis*
5 *Hopea odorata*
6 *Knema tonkinensis*
7 *Platanus kerrii*
8 *Taraktogenos annamensis*

9.3 Analysis and processing of national data

This step is not necessary.

9.4 Reclassification into FRA 2005 classes

This step is not necessary.

9.5 Data for National reporting table T9

FRA 2005 Categories	Number of species (year 2000)
Native tree species	1457
Critically endangered tree species	5
Endangered tree species	7
Vulnerable tree species	8

9.6 Comments to National reporting table T9

No national information is available on number of native and threatened species in Laos.

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)
DOF. 2000. NFI Database. Department of Forestry. National Office of Forest Inventory and Planning. Lao PDR.	L	Extent	1990

10.2.2 Classifications and Definitions

No national information is available.

10.2.3 Original data

The NFI (1990) provides estimates of growing stock per hectare by following main species.

Species Scientific name	cubic meters/ha)
Dipterocarpus tuberculatus	0.002
Dalbergia kerii	0.109
Shorea obtusa	0.085
Afzelia xylocapa	1.272
Hopea feerea P	2.013
Pinus khasya	6.820
Dipterocarpus alatus	5.850
Pterocarpus macrocarpus	1.300
Dipterocarpus obtusifolius	0.503
Anisoptera cochinchinensis	5.362
Remainder of species	n.a.

10.3 Analysis and processing of national data

10.3.1 Calibration

This step is not necessary.

10.3.2 Estimation and forecasting

To develop this table, it is assumed that the species-wise growing stock per hectare in 2000 is same as in 1990.

The species-wise growing stock is calculated by multiplying per hectare figures with area of forests in 1990. The growing stock of remaining species is calculated as the difference in the total growing stock in 1990 and 2000 and the total growing stock of main species in 1990 and 2000.

FRA 2005 Categories / Species name (Scientific name and common name)	**Growing Stock in Forests (million cubic meters)**	
	1990	**2000**
Dipterocarpus tuberculatus	0.03	0.03
Dalbergia kerii	1.89	1.80
Shorea obtusa	1.47	1.41
Afzelia xylocapa	22.02	21.03
Hopea feerea P	34.85	33.28
Pinus khasya	118.08	112.75
Dipterocarpus alatus	101.29	96.71
Pterocarpus macrocarpus	22.51	21.49
Dipterocarpus obtusifolius	8.71	8.32
Anisoptera cochinchinensis	92.84	88.65
Remainder of species	622.47	594.37
TOTAL	**1026.15**	**979.84**

10.4 Data for National reporting table T10

FRA 2005 Categories / Species name (Common name)	**FRA 2005 Categories / Species name (Scientific name)**	**Growing Stock in Forests (million cubic meters)**	
		1990	**2000**
	Pinus khasya	118.08	112.75
	Dipterocarpus alatus	101.29	96.71
	Anisoptera cochinchinensis	92.84	88.65
	Hopea feerea P	34.85	33.28
	Pterocarpus macrocarpus	22.51	21.49
	Afzelia xylocapa	22.02	21.03
	Dipterocarpus obtusifolius	8.71	8.32
	Dalbergia kerii	1.89	1.80
	Shorea obtusa	1.47	1.41
	Dipterocarpus tuberculatus	0.03	0.03
	Remainder of species	622.31	594.53
	TOTAL	1026.00	980.00

10.5 Comments to National reporting table T10

1. The NFI (1990) provides estimates of growing stock per hectare by following main species. The species-wise growing stock is calculated by multiplying per hectare figures with area of forests in 1990. The growing stock of remaining species is calculated as the difference in the total growing stock in 1990 and 2000 and the total growing stock of main species in 1990 and 2000.

2. To develop this table, it is assumed that the species-wise growing stock per hectare in 2000 is same as in 1990.

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)
FAOSTAT. FAO. Rome	H	Wood Removal	1988-2002
GOL. 2002. Prime Minister order No. 18/PM of 4 October 2002 on Forest Management Policy. Government of Laos. Vientiane. Lao PDR.	H	Wood Removal	2002 and beyond.

11.2.2 Classification and definitions

No national information is available.

11.2.3 Original data

No documented national data is available hence FAOSTAT (under bark) data has been used. It has bee multiplies with a factor of 1.15 to convert the data into cover bark measurements.

Year	FAOSTAT (000 m^3 under bark)		Over bark (1.15*Under bark)	
	Industrial Wood	Wood Fuel	Industrial Wood	Wood Fuel
1988	311	5,619	358	6462
1989	314	5,593	361	6432
1990	455	5,627	523	6471
1991	637	5,679	733	6531
1992	355	5,693	408	6547
1993	629	5,716	723	6573
1994	666	5,715	766	6572
1995	994	5,730	1143	6590
1996	782	5,765	899	6629
1997	685	5,798	788	6668
1998	571	5,815	657	6687
1999	866	5,843	996	6719
2000	567	5,872	652	6753
2001	570	5,885	656	6768
2002	392	5,899	451	6784

11.3 Analysis and processing of national data

11.3.1 Calibration

This step is not necessary.

11.3.2 Estimation and forecasting

Five year averages for 1990 and 2000 have been developed for reporting in this table. The figure for 2005 has been assumed same as in 2000 because government commitment of 2002 to restrict export and logging and follow SFM practices.

Type of Wood	**Average round wood removal in 000 m3**		
	1990	**2000**	**2005**
Industrial Wood	477	682	682
Wood Fuel	6488	6742	6742

11.4 Reclassification into FRA 2005 classes

This step is not needed.

11.5 Data for National reporting table T11

FRA 2005 Categories	**Volume in 1000 cubic meters of roundwood over bark**					
	Forest			**Other wooded land**		
	1990	**2000**	**2005**	**1990**	**2000**	**2005**
Industrial roundwood	477	682	682			
Woodfuel	6488	6742	6742			
TOTAL for Country	6965	7424	7424			

11.6 Comments to National reporting table T11

1. No documented national data is available hence FAOSTAT (under bark) data has been used. It has bee multiplies with a factor of 1.15 to convert the data into cover bark measurements.
2. Five year averages for 1990 and 2000 have been developed for reporting in this table. The figure for 2005 has been assumed same as in 2000 because government commitment of 2002 to restrict export and logging and follow SFM practices.

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)
Southavilay, Thongleua and Tuukka Castrén. 1998. Timber Trade And Wood Flow Study - Lao PDR. Regional Environmental Technical Assistance 5771. Poverty Reduction & Environmental Management in Remote Greater Mekong Subregion (GMS) Watersheds Project (Phase I). LAO PDR.	M	Value of Wood removal	1993 to 1998

12.2.2 Classification and definitions

The country uses the term “Royalty” which in practice mean the value per cubic meter of round wood that the owner (Government) receives at stump in forests.

12.2.3 Original data

The value per cubic meter of wood removal or royalty (stumpage fees) is set by administrative orders and is not directly and systematically linked to market prices (Southavilay and Castrén, 1998.). These prices are set by using the residual pricing approach (export value of logs less operating costs (incl. interest) and acceptable profit).

Item	1994/95	1995/96	1996/97	1997/98
Royalty value (US$/$m^3$)	151	123	76	60

12.3 Analysis and processing of national data

12.3.1 Calibration

This step is not necessary.

12.3.2 Estimation and forecasting

The royalty for 1994/95 has been assumed for 1990 and that for 1997/98 for 2000 and 2005 to calculate following value of the wood removals.

Type of Wood	Value wood removal in 000 US $		
	1990	**2000**	**2005**
Industrial Wood	71961	40931	40931
Wood Fuel	48988	20226	20226
Total	120949	61157	61157

12.4 Reclassification into FRA 2005 classes

This step is not 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	71961	40931	40931			
Woodfuel	48988	20226	20226			
TOTAL for Country	**120949**	**61157**	**61157**			

12.6 Comments to National reporting table T12

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

References to sources of information	**Quality (H/M/L)**	**Variable(s)**	**Year(s)**
FAO. 2002. Non-Wood Forest Products in 15 Countries of Tropical Asia an Overview. EC-FAO Partnership Programme (2000-2002). FAO Regional Office for Asia and the Pacific. Bangkok. Thailand.	M	NWFP Removal	1998

13.2.2 Classification and definitions

No national information is available.

13.2.3 Original data

The FAO (2002) provides following information on the NWFP removals and their value. Most of this information relates to the exported quantity in 1998 and its value.

FRA Category of NWFP	National NWFP name	Removal (tonnes)	Value in US $
Food			
	Bamboo Shoots	10	167
	Rattan fruits	66	n.a.
	Sugar Palm Fruits	982	320132
	Malva nuts	838	1340704
	Subtotal	**1896**	**1661003**
Medicine			
	Cardamom	424	2376343
	Yahoa medicine	33	n.a.
	Eaglewood	26	n.a.
	Bong bark	287	91747
	Sa pan	168	37800
	Subtotal	**938**	**2505890**
Utensils, handicrafts			
	Paper Mulberry	400	200000
	Broom grass	826	350022
	Bamboo culms	161	16100
	Rattan	12	1200
	Subtotal	**1399**	**567322**
Ornamental			
	Orchid stems	68	n.a.
	Subtotal	**68**	**n.a.**
Exudates	Damar resin	96566	305113
	Oleoresin	274	92198
	Benzoin	16	46500
	Meuak bark	92	18300
	Fern roots	1	2530
	Vomica nuts	25	2010
	Dragon's blood plant	178	71200
	Sisiet bark	1	n.a.
	Subtotal	**97153**	**537851**
Honey and Bees wax	Honey and Bees wax	2	25232
	Subtotal	**2**	**25232**

13.3 Analysis and processing of national data

13.3.1 Calibration

This step is not necessary.

13.3.2 Estimation and forecasting

The information in FAO (2002) is mostly for 1998. It is the only information available with FAO on NWFP removal in Laos. It has been assumed for 2000.

FRA Category of NWFP	Removal tonnes
Food	1896
Medicine and Aromatic	938
Utensils, handicrafts etc.	1399
Ornamental	68
Exudates	97153
Honey and Bees wax	2

13.4 Reclassification into FRA 2005 classes

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.d.a.	1896	n.d.a.
2. Fodder			n.d.a.		n.d.a.
3. Raw material for medicine and aromatic products			n.d.a.	938	n.d.a.
4. Raw material for colorants and dyes			n.d.a.		n.d.a.
5. Raw material for utensils, handicrafts & construction			n.d.a.	1399	n.d.a.
6. Ornamental plants			n.d.a.	68	n.d.a.
7. Exudates			n.d.a.	97153	n.d.a.
8. Other plant products			n.d.a.	n.d.a.	n.d.a.
Animal products / raw material					
9. Living animals					
10. Hides, skins and trophies					
11. Wild honey and bee-wax			n.d.a.	2	n.d.a.
12. Bush meat					
13. Raw material for medicine					
14. Raw material for colorants					
15. Other edible animal products					
16. Other non-edible animal products					

13.6 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

References to sources of information	**Quality (H/M/L)**	**Variable(s)**	**Year(s)**
FAO. 2002. Non-Wood Forest Products in 15 Countries of Tropical Asia an Overview. EC-FAO Partnership Programme (2000-2002). FAO Regional Office for Asia and the Pacific. Bangkok. Thailand.	M	NWFP Removal	1998

14.2.2 Classification and definitions

No national information is available.

14.2.3 Original data

The FAO (2002) provides following some information on the NWFP removals and their value. The most of the information relates to the exported quantity in 1998 and its value.

FRA Category of NWFP	NWFP	Removal tonnes	Value in US $
Food			
	Bamboo Shoots	10	167
	Rattan fruits	66	n.a.
	Sugar Palm Fruits	982	320132
	Malva nuts	838	1340704
	Subtotal	**1896**	**1661003**
Medicine and Aromatics			
	Cardamom	424	2376343
	Yahoa medicine	33	n.a.
	Eaglewood	26	n.a.
	Bong bark	287	91747
	Sa pan	168	37800
	Subtotal	**938**	**2505890**
Utensils, handicrafts			
	Paper Mulberry	400	200000
	Broom grass	826	350022
	Bamboo culms	161	16100
	Rattan	12	1200
	Subtotal	**1399**	**567322**
Ornamental			
	Orchid stems	68	n.a.
	Subtotal	**68**	**n.a.**
Exudates	Damar resin	96566	305113
	Oleoresin	274	92198
	Benzoin	16	46500
	Meuak bark	92	18300
	Fern roots	1	2530
	Vomica nuts	25	2010
	Dragon's blood plant	178	71200
	Sisiet bark	1	n.a.
	Subtotal	**97153**	**537851**
Honey and Bees wax	Honey and Bees wax	2	25232
	Subtotal	**2**	**25232**

14.3 Analysis and processing of national data

14.3.1 Calibration

This step is not necessary.

14.3.2 Estimation and forecasting

The information in FAO (2002) which is mostly for 1998 is the only information available on NWFP removal. It has been assumed for 2000.

FRA Category of NWFP	Value (000 US$)
Food	1661
Medicine and Aromatic	2506
Utensils, handicrafts etc.	567
Ornamental	n.a.
Exudates	538
Honey and Bees wax	25
Total	5297

14.4 Reclassification into FRA 2005 classes

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.d.a.	1661	n.d.a.
2. Fodder			
3. Raw material for medicine and aromatic products	n.d.a.	2506	n.d.a.
4. Raw material for colorants and dyes			
5. Raw material for utensils, handicrafts & construction	n.d.a.	567	n.d.a.
6. Ornamental plants			
7. Exudates	n.d.a.	538	n.d.a.
8. Other plant products			
Animal products / raw material 9. Living animals			
10. Hides, skins and trophies			
11. Wild honey and bee-wax	n.d.a.	25	n.d.a.
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	**n.d.a.**	**5297**	**n.d.a.**

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)
Lebedyes, Arvydas. 2004. Trends and current status of the contribution of the forestry sector to national economies. Working Paper FSFM/ACC/07. FOPE. FAO. Rome.	M	Employment	1990-2000
UNEP, 2005. Website of UNEP-WCMC (http://sea.unep-wcmc.org/sites/country/lao.htm). 1992 Protected Areas of the World: A review of national systems : Lao People's Democratic Republic.	H	Employment	1992

15.2.2 Classification and definitions

No national classification and definitions are available.

15.2.3 Original data

Lebedyes (2004) has estimated following employment from forestry activities based on round-wood production.

Year	Employment (000 person years)
1990	3
1991	3
1992	2
1993	3
1994	4
1995	5
1996	4
1997	4
1998	3
1999	5
2000	3

The website of UNEP (2005) indicates that there are 25 fulltime profession staff in the protected area system. This figure has been used for employment through provision of services.

15.3 Analysis and processing of national data

15.3.1 Calibration

This step is not necessary.

15.3.2 Estimation and forecasting

Only three year average is possible with above data i.e. 1990 to 1992 data for 1990 and 1998 to 2000 data for 2000. It leads to average of 3,000 and 4000 person year employment in 1990 and 2000 respectively. All this employment is being treated as production related employment.

The website of UNEP (2005) indicates that there are 25 fulltime profession staff in the protected area system. This figure has been used for employment through provision of services in 1990 and 2000.

15.4 Reclassification into FRA 2005 classes

This step is not necessary.

15.5 Data for National reporting table T15

FRA 2005 Categories	**Employment (1000 person-years)**	
	1990	**2000**
Primary production of goods	3.00	4.00
Provision of services	0.03	0.03
Unspecified forestry activities		
TOTAL	**3,03**	**4.03**

15.6 Comments to National reporting table T15