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Food and Agriculture Organization of the United Nations

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ASSESSMENT 2010**

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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 2010 (FRA 2010).

The reporting framework for FRA 2010 is based on the thematic elements of sustainable forest management acknowledged in intergovernmental forest-related fora and includes variables related to the extent, condition, uses and values of forest resources, as well as the policy, legal and institutional framework related to forests. More information on the FRA 2010 process and the results - including all the country reports - is available on the FRA Web site (www.fao.org/forestry/fra).

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The Global Forest Resources Assessment Country Report Series is designed to document and make available the information forming the basis for the FRA 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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Introduction

This country report is the first official report submitted in the FRA project. Since there has been no national forest resource inventory carried out, the report is based on the best available information from relevant ministries, national and regional organisations, and NGOs that have some involvements or interest in the management of the forest resources in the Kingdom.

1 Table T1 – Extent of Forest and Other wooded land

1.1 FRA 2010 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 <i>in situ</i> . 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 <i>in situ</i> ; 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
Ministry of Land, Survey, Natural Resources, and Environment’s (MLSNE) GIS Information and Mapping Unit.	M	Land use, agricultural land, ownership, forest cover	1998	Based on GIS Information, Satellite Images Interpretation, and remote sensing
Forestry, MAFFF	H	Area, location, species,	2000	Based on reports of inventories carried out on two islands.

1.2.2 Classification and definitions

National class	Definition
Forests	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 <i>in situ</i> . It does not include land that is predominantly under agricultural or urban land use.
Forest plantation	
Mangroves / saline wetland	
Coconut on agricultural land	Other land with tree cover
Built-up area	Other land
Estuary mud land / wetland	
Landfill	
Rock	
Sand	
Water-body	Inland water bodies generally include major rivers, lakes and water reservoirs.

1.2.3 Original data

The original data is based on the Ministry of Land classification and interpretation.

National classification	1998 Area (ha)
Forests	7,000
Forest Plantation	1,000
Mangroves / saline wetland	1,000
Mixed and Intercropping with trees	55,830
Built-up area	4,378
Estuary mud land / wetland	544
Landfill	7
Rock	1,927
Sand	337
Water-body	2,977
TOTAL	75,000

The forest categories and types are based on the Ministry of Land's GIS information and mapping; the species composition, yield per hectare, etc. are based on Forestry data and information. With the exception of the forestry plantation, no field verification had been done.

1.3 Analysis and processing of national data

The increased recognition, both internationally and locally, of the important contributions of forests attributed to global socioeconomic and environmental issues has resulted in more attentions being given for the protection and sustainable management of forest and tree resources at the national level.

1.3.1 Calibration

No calibration is needed.

1.3.2 Estimation and forecasting

It is more likely that there will be an increase in the forest areas designated for conservation purposes and other related activities with field verification of different zone boundaries. At the same time, an increase in areas of agricultural land will be allocated to other form of land use for social and economic development.

1.3.3 Reclassification into FRA 2010 categories

	Forests	Other land with tree cover	Other land
Forests	100%		
Forest plantation	100%		
Mangroves / saline wetland	100%		
Coconut on agricultural land		100%	
Built-up area		30%	70%
Estuary mud land / wetland			100%
Landfill			100%
Rock			100%
Sand			100%

1.4 Data for Table T1

FRA 2010 categories	Area (1000 hectares)			
	1990	2000	2005	2010
Forest	9	9	9	9
Other wooded land	0	0	0	0
Other land	63	63	63	63
...of which with tree cover	57	57	57	57
Inland water bodies	3	3	3	3
TOTAL	75	75	75	75

1.5 Comments to Table T1

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Forest	Most of the natural forest virtually inaccessible either because of very steep terrains or of geographical isolation / remoteness.	Data is not available to determine a trend, thus the 1998 figure has been reported for all reporting years.
Other wooded land		
Other land	This category consists mainly of agricultural land and other land uses.	
Other land with tree cover		
Inland water bodies	This refers to lakes and any water bodies.	

Other general comments to the table

The absence of concrete information on the potential contributions of forests at the national developments has resulted in the undervaluation of forests contributions in the national account. This has been repeatedly quoted in a series of study reports carried out for the development of national economy.

Expected year for completion of ongoing/planned national forest inventory and/or RS survey / mapping

Review of the GIS information and remote sensing and mapping	2010 – 2015
Field verification sampling survey	2010 – 2015

2 Table T2 – Forest ownership and management rights

2.1 FRA 2010 Categories and definitions

Category	Definition
Public ownership	Forest owned by the State; or administrative units of the public administration; or by institutions or corporations owned by the public administration.
Private ownership	Forest owned by individuals, families, communities, private co-operatives, corporations and other business entities, private religious and educational institutions, pension or investment funds, NGOs, nature conservation associations and other private institutions.
Individuals (<i>sub-category of Private ownership</i>)	Forest owned by individuals and families.
Private business entities and institutions (<i>sub-category of Private ownership</i>)	Forest owned by private corporations, co-operatives, companies and other business entities, as well as private non-profit organizations such as NGOs, nature conservation associations, and private religious and educational institutions, etc.
Local communities (<i>sub-category of Private ownership</i>)	Forest owned by a group of individuals belonging to the same community residing within or in the vicinity of a forest area. The community members are co-owners that share exclusive rights and duties, and benefits contribute to the community development.
Indigenous / tribal communities (<i>sub-category of Private ownership</i>)	Forest owned by communities of indigenous or tribal people.
Other types of ownership	Other kind of ownership arrangements not covered by the categories above. Also includes areas where ownership is unclear or disputed.
Categories related to the holder of management rights of public forest resources	
Public Administration	The Public Administration (or institutions or corporations owned by the Public Administration) retains management rights and responsibilities within the limits specified by the legislation.
Individuals/households	Forest management rights and responsibilities are transferred from the Public Administration to individuals or households through long-term leases or management agreements.
Private institutions	Forest management rights and responsibilities are transferred from the Public Administration to corporations, other business entities, private co-operatives, private non-profit institutions and associations, etc., through long-term leases or management agreements.
Communities	Forest management rights and responsibilities are transferred from the Public Administration to local communities (including indigenous and tribal communities) through long-term leases or management agreements.
Other form of management rights	Forests for which the transfer of management rights does not belong to any of the categories mentioned above.

2.2 National data

2.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Ministry of LSNE	H	Ownership, area, legal status	1998	
Forestry, MAFFF	M	Ownership, area, land use.	2000	

2.2.2 Classification and definitions

National class	Definition
Public Administration	Government or public lands.
Individuals/households	Allocated or registered land by individual.
Private lands	Allocated or registered estates.
Leasehold lands	Land under legal lease arrangement for a definite period.

2.2.3 Original data

Data is based on expert guest estimates.

2.3 Analysis and processing of national data

2.3.1 Calibration

No calibration required.

2.3.2 Estimation and forecasting

Conversion of agricultural land into settlements and other land uses is becoming common practice.

2.3.3 Reclassification into FRA 2010 categories

National class	Forests	Other land with tree cover
Public Administration	56%	10%
Individuals/households		100%
Private lands	44%	100%
Leasehold lands		

2.4 Data for Table T2

Table 2a - Forest ownership

FRA 2010 Categories	Forest area (1000 hectares)		
	1990	2000	2005
Public ownership	5	5	5
Private ownership	4	4	4
...of which owned by individuals	0	0	0
...of which owned by private business entities and institutions	0	0	0
...of which owned by local communities	0	0	0
...of which owned by indigenous / tribal communities	0	0	0
Other types of ownership	0	0	0
TOTAL	9	9	9

Note: If other types of ownership is reported, please specify details in comment to the table.

Does ownership of trees coincide with ownership of the land on which they are situated?	<input checked="" type="checkbox"/>	Yes
	<input type="checkbox"/>	No
If No above, please describe below how the two differ:		

Table 2b - Holder of management rights of public forests

FRA 2010 Categories	Forest area (1000 hectares)		
	1990	2000	2005
Public Administration	4	4	4
Individuals	0	0	0
Private corporations and institutions	1	1	1
Communities	0	0	0
Other	0	0	0
TOTAL	5	5	5

(Pls note that private corporations and institutions are owned by government; these are under consideration to become full privatisation in the current govt reform program)

2.5 Comments to Table T2

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Public ownership		
Private ownership	Land that have been allocated or registered by individuals.	
Other types of ownership		
Management rights	Right to use the land including trees unless otherwise stated in the agreement.	

Other general comments to the table
Normally, once the land is allocated and registered management and utilisation of forest and tree resources is at the disposal of the legal owner.

3 Table T3 – Forest designation and management

3.1 FRA 2010 Categories and definitions

Term	Definition
Primary designated function	The primary function or management objective assigned to a management unit either by legal prescription, documented decision of the landowner/manager, or evidence provided by documented studies of forest management practices and customary use.
Protected areas	Areas especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.
Categories of primary designated functions	
Production	Forest area designated primarily for production of wood, fibre, bio-energy and/or non-wood forest products.
Protection of soil and water	Forest area designated primarily for protection of soil and water.
Conservation of biodiversity	Forest area designated primarily for conservation of biological diversity. Includes but is not limited to areas designated for biodiversity conservation within the protected areas.
Social services	Forest area designated primarily for social services.
Multiple use	Forest area designated primarily for more than one purpose and where none of these alone is considered as the predominant designated function.
Other	Forest areas designated primarily for a function other than production, protection, conservation, social services or multiple use.
No / unknown	No or unknown designation.
Special designation and management categories	
Area of permanent forest estate (PFE)	Forest area that is designated to be retained as forest and may not be converted to other land use.
Forest area within protected areas	Forest area within formally established protected areas independently of the purpose for which the protected areas were established.
Forest area under sustainable forest management	To be defined and documented by the country.
Forest area with management plan	Forest area that has a long-term (ten years or more) documented management plan, aiming at defined management goals, which is periodically revised.

3.2 National data

3.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Ministry of LSNE	M	Areas, species, location,	1998	
Forestry, MAFFF	M		1995	

3.2.2 Classification and definitions

Term	Definition
Production	Forests (plantation) that are managed for timber production on sustainable basis.
Protection of soil and water	Forests that are managed as watershed areas and to protect soil erosion.
Conservation of biodiversity	Forests that are protected because of biodiversity value.
Social services	Forests that are managed for communal benefits.
Multiple use	Mostly agricultural land but also includes the above classifications depending on the land potentials and capabilities.
Other (please specify in comments below the table)	
No / unknown	

3.2.3 Original data

The original data is expert guest based on the data and information provided by the Environment Unit of the Ministry of LSNE.

3.3 Analysis and processing of national data

3.3.1 Calibration

No calibration required.

3.3.2 Estimation and forecasting

Community involvement in the decision making is a prerequisite in the future management or allocation of forest resources.

3.4 Data for Table T3

Table 3a – Primary designated function

FRA 2010 Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010
Production	1	1	1	1
Protection of soil and water	0.6	0.6	0.6	0.6
Conservation of biodiversity	7.4	7.4	7.4	7.4
Social services	0	0	0	0
Multiple use	0	0	0	0
Other (please specify in comments below the table)	0	0	0	0
No / unknown	0	0	0	0
TOTAL	9	9	9	9

Table 3b – Special designation and management categories

FRA 2010 Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010
Area of permanent forest estate	6.7	6.7	6.7	6.7
Forest area within protected areas	n.a.	n.a.	n.a.	n.a.
Forest area under sustainable forest management	8	8	8	8
Forest area with management plan	2.0	2.0	2.0	2.0

The criteria used for estimating the forest area under sustainable forest management is based on the areas approved (gazetted) by Government to be designated for conservation purposes. This includes national park, historical sites, watershed areas, etc.

3.5 Comments to Table T3

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Production	This is the forest plantation.	
Protection of soil and water	This is the watershed areas. With soil erosion, this refers to areas on steep slope that had been allocated for land use.	
Conservation of biodiversity	Designated areas for biodiversity conservation.	
Social services		
Multiple use		
Other		
No / unknown designation		
Area of permanent forest estate	This includes government unallocated land or area declared under forest reserve.	
Forest area within protected areas		
Forest area under sustainable forest management		
Forest area with management plan	Designated forests which has specific management objective (s) and an approved management plan for its protection and development. Most areas have been designated but yet to have a management plan	

Other general comments to the table

4 Table T4 – Forest characteristics

4.1 FRA 2010 Categories and definitions

Term / category	Definition
Naturally regenerated forest	Forest predominantly composed of trees established through natural regeneration.
Introduced species	A species, subspecies or lower taxon, occurring <u>outside</u> its natural range (past or present) and dispersal potential (i.e. outside the range it occupies naturally or could occupy without direct or indirect introduction or care by humans).
Characteristics categories	
Primary forest	Naturally regenerated forest of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed.
Other naturally regenerated forest	Naturally regenerated forest where there are clearly visible indications of human activities.
Other naturally regenerated forest of introduced species (sub-category)	Other naturally regenerated forest where the trees are predominantly of introduced species.
Planted forest	Forest predominantly composed of trees established through planting and/or deliberate seeding.
Planted forest of introduced species (sub-category)	Planted forest, where the planted/seeded trees are predominantly of introduced species.
Special categories	
Rubber plantations	Forest area with rubber tree plantations.
Mangroves	Area of forest and other wooded land with mangrove vegetation.
Bamboo	Area of forest and other wooded land with predominant bamboo vegetation.

4.2 National data

4.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Forestry, MAFFF	M	Area, species, volumes,		

4.2.2 Classification and definitions

Term / category	Definition
Naturally regenerated forest	Forest predominantly composed of trees established through natural regeneration.
Introduced species	A species, subspecies or lower taxon, occurring <u>outside</u> its natural range (past or present) and dispersal potential (i.e. outside the range it occupies naturally or could occupy without direct or indirect introduction or care by humans).
Characteristics categories	
Primary forest	Naturally regenerated forest of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed.
Other naturally regenerated forest	Naturally regenerated forest where there are clearly visible indications of human activities.
Planted forest	Forest predominantly composed of trees established through planting and/or deliberate seeding.

Planted forest of introduced species (<i>sub-category</i>)	Planted forest, where the planted/seeded trees are predominantly of introduced species.
Special categories	
Mangroves	Area of forest and other wooded land with mangrove vegetation.

4.2.3 Original data

Original data is based on satellite images interpretation.

4.3 Analysis and processing of national data

Data is based on satellite images interpretation only; no field verification conducted.

4.3.1 Calibration

No calibration is needed.

4.3.2 Estimation and forecasting

On remote islands, forest succession is expected to occur on uncultivated agricultural land.

4.4 Data for Table T4

Table 4a

FRA 2010 Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010
Primary forest	4	4	4	4
Other naturally regenerated forest	4	4	4	4
...of which of introduced species	n.a.	n.a.	n.a.	n.a.
Planted forest	1	1	1	1
...of which of introduced species	1	1	1	1
TOTAL	9	9	9	9

Table 4b

FRA 2010 Categories	Area (1000 hectares)			
	1990	2000	2005	2010
Rubber plantations (Forest)	0	0	0	0
Mangroves (Forest and OWL)	1	1	1	1
Bamboo (Forest and OWL)	n.a.	n.a.	n.a.	n.a.

4.5 Comments to Table T4

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Primary forest	Reported figures are based on expert guess.	
Other naturally regenerating forest		
Planted forest		
Mangroves		
Bamboo		

Other general comments to the table
Reported figures are based on satellite image interpretation, needs field verification of the original data.

5 Table T5 – Forest establishment and reforestation

5.1 FRA 2010 Categories and definitions

Term	Definition
Afforestation	Establishment of forest through planting and/or deliberate seeding on land that, until then, was not classified as forest.
Reforestation	Re-establishment of forest through planting and/or deliberate seeding on land classified as forest.
Natural expansion of forest	Expansion of forests through natural succession on land that, until then, was under another land use (e.g. forest succession on land previously used for agriculture).

5.2 National data

5.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Forestry, MAFFF	H	AREA, SPECIES	2000s	

5.2.2 Classification and definitions

Term	Definition
Afforestation	Establishment of forest through planting on land that was not classified as forest.
Reforestation	Re-establishment of forest through planting on land classified as forest.
Natural expansion of forest	Forest succession on agricultural land.

5.2.3 Original data

Based on expert estimates.

5.3 Analysis and processing of national data

Agricultural land offers great opportunity for promoting tree planting through agroforestry practice or boundary planting.

5.3.1 Calibration

No calibration is needed.

5.3.2 Estimation and forecasting

The anticipation is an increase in tree planting on agricultural land.

5.3.3 Reclassification into FRA 2010 categories

5.4 Data for Table T5

FRA 2010 Categories	Annual forest establishment (hectares/year)			...of which of introduced species ¹⁾ (hectares/year)		
	1990	2000	2005	1990	2000	2005
Afforestation	n.a.	n.a.	63.0	n.a.	n.a.	63.0
Reforestation	n.a.	n.a.	1.5	n.a.	n.a.	1.5
...of which on areas previously planted	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Natural expansion of forest	n.a.	n.a.	0.1	n.a.	n.a.	0.1

Note: The figures for the reporting years refer to the averages for the 5-year periods 1988-1992, 1998-2002 and 2003-2007 respectively.

5.5 Comments to Table T5

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Afforestation	Mainly occur on agricultural land.	
Reforestation	Mainly occur on forest land.	
Natural expansion of forest	Forest succession on encroachment forest area.	

Other general comments to the table

6 Table T6 – Growing stock

6.1 FRA 2010 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.
Growing stock of commercial species	Growing stock (see def. above) of commercial species.

6.2 National data

6.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Forestry, MAFFF	M	Area, species, volumes	1998	

6.2.2 Classification and definitions

National class	Definition
Growing stock	Volume over bark of merchantable logs.
Growing stock of commercial species	Volume over bark (merchantable logs) of commercial species

6.2.3 Original data

Based on expert guest.

6.3 Analysis and processing of national data

Conversion factors used:

Growing stock:

Forest : 150 m³/ha

Plantation: 200 m³/ha

6.4 Data for Table T6

Table 6a – Growing stock

FRA 2010 category	Volume (million cubic meters over bark)							
	Forest				Other wooded land			
	1990	2000	2005	2010	1990	2000	2005	2010
Total growing stock	1.4	1.4	1.4	1.4				
... of which coniferous	n.a.	n.a.	n.a.	n.a.				
... of which broadleaved	n.a.	n.a.	n.a.	n.a.				
Growing stock of commercial species	0.6	0.6	0.6	0.6				

Table 6b – Growing stock of the 10 most common species

FRA 2010 category / Species name			Growing stock in forest (million cubic meters)		
Rank	Scientific name	Common name	1990	2000	2005
1 st	<i>Clophyllu inophyllum</i>	Tamanu	0.8	0.8	0.8
2 nd	<i>Alphitonia taitensis</i>	toi			
3 rd	<i>Rhus taitensis</i>	tavahi			
4 th	<i>Pinus caribaea</i>	Pine	0.6	0.6	0.6
5 th	<i>Toona australis</i>	Red cedar			
6 th	<i>Agathis robusta</i>	Kauri			
7 th	<i>Santalum yasi</i>	Sandalwood			
8 th					
9 th					
10 th					
Remaining					
TOTAL			1.4	1.4	1.4

Note: Rank refers to the order of importance in terms of growing stock, i.e. 1st is the species with the highest growing stock. Year 2000 is the reference year for defining the species list and the order of the species.

Table 6c – Specification of threshold values

Item	Value	Complementary information
Minimum diameter (cm) at breast height ¹ of trees included in growing stock (X)		
Minimum diameter (cm) at the top end of stem for calculation of growing stock (Y)		
Minimum diameter (cm) of branches included in growing stock (W)		
Volume refers to “above ground” (AG) or “above stump” (AS)	AS	

¹ Diameter at breast height (DBH) refers to diameter over bark measured at a height of 1.30 m above ground level or 30 cm above buttresses if these are higher than 1 m.

6.5 Comments to Table T6

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Total growing stock	Volume over bark of merchantable logs.	
Growing stock of broadleaved / coniferous		
Growing stock of commercial species		
Growing stock composition		

Other general comments to the table
Needs inventory of national forest resource.

7 Table T7 – Biomass stock

7.1 FRA 2010 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 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	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.

7.2 National data

7.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Forestry, MAFFF	M	AREA, YIELD / HA		

7.2.2 Classification and definitions

National class	Definition
Above-ground biomass	FRA 2010 classification and definitions is applicable.
Below-ground biomass	
Dead wood	

7.2.3 Original data

Original data is based on growing stock and forest area reported in table T1 and T6. Table 1 classification

7.3 Analysis and processing of national data

Conversion factors used:

Growing stock:

Forest : 150 m³/ha

Plantation: 200 m³/ha

BCEF: 1.3

Root-shoot ratio: 0.20

7.4 Data for Table T7

FRA 2010 category	Biomass (million metric tonnes oven-dry weight)							
	Forest				Other wooded land			
	1990	2000	2005	2010	1990	2000	2005	2010
Above-ground biomass	1.82	1.82	1.82	1.82				
Below-ground biomass	0.36	0.36	0.36	0.36				
Dead wood	n.a	n.a	n.a	n.a				
TOTAL	n.a	n.a	n.a	n.a				

7.5 Comments to Table T7

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Above-ground biomass		
Below-ground biomass		
Dead wood		

Other general comments to the table

8 Table T8 – Carbon stock

8.1 FRA 2010 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 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	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 the minimum diameter for dead wood (e.g. 10 cm), lying dead in various states of decomposition above the mineral or organic soil.
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.

8.2 National data

8.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Forestry, MAFFF	M			

8.3 Analysis and processing of national data

Conversion factors:

Carbon fraction 0.47

Carbon content in soil 65 (t C ha⁻¹)

8.4 Data for Table T8

FRA 2010 Category	Carbon (Million metric tonnes)							
	Forest				Other wooded land			
	1990	2000	2005	2010	1990	2000	2005	2010
Carbon in above-ground biomass	0.86	0.86	0.86	0.86				
Carbon in below-ground biomass	0.17	0.17	0.17	0.17				
<i>Sub-total: Living biomass</i>	<u>1.03</u>	<u>1.03</u>	<u>1.03</u>	<u>1.03</u>				
Carbon in dead wood	n.a	n.a	n.a	n.a				
Carbon in litter	n.a	n.a	n.a	n.a				
<i>Sub-total: Dead wood and litter</i>	n.a	n.a	n.a	n.a				
Soil carbon	0.6	0.6	0.6	0.6				
TOTAL	n.a	n.a	n.a	n.a				

Soil depth (cm) used for soil carbon estimates	30
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8.5 Comments to Table T8

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Carbon in above-ground biomass		
Carbon in below-ground biomass		
Carbon in dead wood		
Carbon in litter		
Soil carbon		

Other general comments to the table

9 Table T9 – Forest fires

9.1 FRA 2010 Categories and definitions

Category	Definition
Number of fires	Average number of vegetation fires per year in the country.
Area affected by fire	Average area affected by vegetation fires per year in the country.
Vegetation fire (<i>supplementary term</i>)	Any vegetation fire regardless of ignition source, damage or benefit.
Wildfire	Any unplanned and/or uncontrolled vegetation fire.
Planned fire	A vegetation fire regardless of ignition source that burns according to management objectives and requires limited or no suppression action.

9.2 National data

9.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Forestry, MAFFF	H	AREA, SPECIES,		
Police Fire Services	H	Area, values		

9.2.2 Classification and definitions

National class	Definition
Number of fires	FRA 2010 classifications and definitions is applicable.
Area affected by fire	
Vegetation fire (<i>supplementary term</i>)	
Wildfire	
Planned fire	

9.2.3 Original data

Information provided by the Police Fire Service.

9.3 Analysis and processing of national data

9.3.1 Calibration

No calibration is needed.

9.3.2 Estimation and forecasting

Most of the fires will occur on agricultural land and will threaten the young trees or regeneration.

9.4 Data for Table T9

Table 9a

FRA 2010 category	Annual average for 5-year period					
	1990		2000		2005	
	1000 hectares	number of fires	1000 hectares	number of fires	1000 hectares	number of fires
Total land area affected by fire	n.a	n.a	n.a	n.a	n.a	n.a
... of which on forest	0	0	0	0	0	0
... of which on other wooded land	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
... of which on other land	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Table 9b

FRA 2010 category	Proportion of forest area affected by fire (%)		
	1990	2000	2005
Wildfire	0	0	0
Planned fire	0	0	0

Note: The figures for the reporting years refer to the averages of annually affected areas for the 5-year periods 1988-1992, 1998-2002 and 2003-2007 respectively

9.5 Comments to Table T9

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Area affected by fire	Insignificant	
Number of fires	Fire is commonly used for land clearing on agricultural land.	
Wildfire / planned fire	Mostly occurred on agricultural land.	

Other general comments to the table
No major forest fire ever recorded.

10 Table T10 – Other disturbances affecting forest health and vitality

10.1 FRA 2010 Categories and definitions

Term	Definition
Disturbance	Damage caused by any factor (biotic or abiotic) that adversely affects the vigour and productivity of the forest and which is not a direct result of human activities.
Invasive species	Species that are non-native to a particular ecosystem and whose introduction and spread cause, or are likely to cause, socio-cultural, economic or environmental harm or harm to human health.
Category	Definition
Disturbance by insects	Disturbance caused by insect pests.
Disturbance by diseases	Disturbance caused by diseases attributable to pathogens, such as bacteria, fungi, phytoplasma or virus.
Disturbance by other biotic agents	Disturbance caused by biotic agents other than insects or diseases, such as wildlife browsing, grazing, physical damage by animals, etc.
Disturbance caused by abiotic factors	Disturbances caused by abiotic factors, such as air pollution, snow, storm, drought, etc.

10.2 National data

10.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Forestry, MAFFF	M	Disease, species, area		

10.2.2 Classification and definitions

National class	Definition
Disturbance by insects	FRA 2010 categories and definitions is applicable.
Disturbance by diseases	
Disturbance by other biotic agents	
Disturbance caused by abiotic factors	
Disturbance by insects	

10.2.3 Original data

No survey conducted. No major outbreak recorded except for *Luceana psyllid*.

10.3 Data for Table T10

Table 10a – Disturbances

FRA 2010 category	Affected forest area (1000 hectares)		
	1990	2000	2005
Disturbance by insects	n.a	n.a	n.a
Disturbance by diseases	n.a	n.a	n.a
Disturbance by other biotic agents	n.a	n.a	n.a
Disturbance caused by abiotic factors	n.a	n.a	n.a
Total area affected by disturbances	n.a	n.a	n.a

Notes: The figures for the reporting years refer to the averages of annually affected areas for the 5-year periods 1988-1992, 1998-2002 and 2003-2007 respectively.

The total area affected by disturbances is not necessarily the sum of the individual disturbances as these may be overlapping.

Table 10b – Major outbreaks of insects and diseases affecting forest health and vitality

Description / name	Tree species or genera affected (scientific name)	Year(s) of latest outbreak	Area affected (1000 hectares)	If cyclic, approx. cycle (years)

Note: Area affected refers to the total area affected during the outbreak.

Table 10c – Area of forest affected by woody invasive species

Scientific name of woody invasive species	Forest area affected 2005 (1000 hectares)
<i>Cordia odorata</i>	0.2

Total forest area affected by woody invasive species	0.2

Note: The total forest area affected by woody invasive species is not necessary the sum of the values above, as these may be overlapping.

10.4 Comments to Table T10

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Disturbance by insects	No survey being conducted	
Disturbance by diseases	No survey being conducted	
Disturbance by other biotic agents	No survey being conducted	
Disturbance caused by abiotic factors	No survey being conducted	
Major outbreaks	No survey being conducted	
Invasive species	Cordia sp was introduced and it has become an invasive species. It spreads quickly and regenerates profoundly.	

Other general comments to the table
So far, no study has been carried out and no major outbreak recorded.

11 Table T11 – Wood removals and value of removals

11.1 FRA 2010 Categories and definitions

Category	Definition
Industrial roundwood removals	The wood removed (volume of roundwood over bark) for production of goods and services other than energy production (woodfuel).
Woodfuel removals	The wood removed for energy production purposes, regardless whether for industrial, commercial or domestic use.

11.2 National data

11.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Forestry, MAFFF	M	Volumes, species, areas		

11.2.2 Classification and definitions

National class	Definition
Industrial roundwood removals	FRA 2010 categories and definitions is applicable.
Woodfuel removals	

11.2.3 Original data

Limited data available.

11.3 Data for Table T11

FRA 2010 Category	Industrial roundwood removals			Woodfuel removals		
	1990	2000	2005	1990	2000	2005
Total volume (1000 m ³ o.b.)	2.3	1.5	1.2	50	50	45
... of which from forest	1.8	1.0	0.7	30	30	30
Unit value (local currency / m ³ o.b.)	250	250	250	100	100	100
Total value (1000 local currency)	575	375	300	5,000	5,000	4,500

Note: The figures for the reporting years refer to the averages of annually affected areas for the 5-year periods 1988-1992, 1998-2002 and 2003-2007 respectively.

	1990	2000	2005
Name of local currency	Pa'anga	Pa'anga	Pa'anga

11.4 Comments to Table T11

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Total volume of industrial roundwood removals	This includes coconut wood for timber production.	
Total volume of woodfuel removals	This is based on an average volume of wood consumption per head.	
Unit value		
Total value	Based on the total population	

Other general comments to the table

12 Table T12 – Non-wood forest products removals and value of removals

12.1 FRA 2010 Categories and definitions

Term	Definition
Non-wood forest product (NWFP)	Goods derived from forests that are tangible and physical objects of biological origin other than wood.
Value of NWFP removals	For the purpose of this table, value is defined as the market value at the site of collection or forest border.

NWFP categories

Category
<u>Plant products / raw material</u>
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
<u>Animal products / raw material</u>
9. Living animals
10. Hides, skins and trophies
11. Wild honey and bee-wax
12. Wild meat
13. Raw material for medicine
14. Raw material for colorants
15. Other edible animal products
16. Other non-edible animal products

12.2 National data

12.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Forestry, MAFFF	L	Products, volumes,		

12.3 Data for Table T12

Rank	Name of product	Key species	Unit	NWFP removals 2005		NWFP category
				Quantity	Value (1000 local currency)	
1 st	Local construction materials					
2 nd	Handicrafts (Carving)					
3 rd	Other minor products					
4 th						
5 th						
6 th						
7 th						
8 th						
9 th						
10 th						
All other plant products						
All other animal products						
TOTAL						

	2005
Name of local currency	Pa'anga

12.4 Comments to Table T12

Variable / category	Comments related to data, definitions, etc.
10 most important products	
Other plant products	
Other animal products	
Value by product	
Total value	

Other general comments to the table
No study has been carried out on minor forest products.

13 Table T13 – Employment

13.1 FRA 2010 Categories and definitions

Category	Definition
Full-time equivalents (FTE)	A measurement equal to one person working full-time during a specified reference period.
Employment	Includes all persons in paid employment or self-employment.
Paid employment	Persons who during a specified reference period performed some work for <u>wage or salary</u> in cash or in kind.
Self-employment	Persons who during a specified reference period performed some work for <u>profit or family gain</u> in cash or in kind (e.g. employers, own-account workers, members of producers' cooperatives, contributing family workers).

13.2 National data

13.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Forestry, MAFFF	M	Employer, employment status, gender, year of service	2000	

13.2.2 Classification and definitions

National class	Definition
Full-time equivalents (FTE)	FRA 2010 Categories and Definitions is applicable.
Employment	
Paid employment	
Self-employment	

13.2.3 Original data

The source of the original data is from Forestry record.

13.3 Analysis and processing of national data

13.3.1 Calibration

Not needed.

13.3.2 Estimation and forecasting

13.3.3 Reclassification into FRA 2010 categories

13.4 Data for Table T13

FRA 2010 Category	Employment (1000 years FTE)		
	1990	2000	2005
Employment in primary production of goods	0.024	0.023	0.021
...of which paid employment	0.021	0.020	0.018
...of which self-employment	0.002	0.002	0.002
Employment in management of protected areas	0.002	0.001	0.001

13.5 Comments to Table T13

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Employment in primary production of goods	This is mainly confined to Forestry Division activities and the company that managed the forestry plantation on commercial basis.	
Paid employment / self-employment	Mainly involved in manufacturing (joinery).	
Employment in management of protected areas	Still in the development phase.	

Other general comments to the table

14 Table T14 – Policy and legal framework

14.1 FRA 2010 Categories and definitions

Term	Definition
Forest policy	A set of orientations and principles of actions adopted by public authorities in harmony with national socio-economic and environmental policies in a given country to guide future decisions in relation to the management, use and conservation of forest and tree resources for the benefit of society.
Forest policy statement	A document that describes the objectives, priorities and means for implementation of the forest policy.
National forest programme (nfp)	A generic expression that refers to a wide range of approaches towards forest policy formulation, planning and implementation at national and sub-national levels. The national forest programme provides a framework and guidance for country-driven forest sector development with participation of all stakeholders and in consistence with policies of other sectors and international policies.
Law (Act or Code) on forest	A set of rules enacted by the legislative authority of a country regulating the access, management, conservation and use of forest resources.

14.2 Data for Table T14

Indicate the existence of the following (2008)		
Forest policy statement with national scope		<input checked="" type="checkbox"/> Yes
		<input type="checkbox"/> No
If Yes above, provide:	Year of endorsement	2008 - Final draft submitted for Ministerial approval.
	Reference to document	Tonga National Forestry Policy
National forest programme (nfp)		<input checked="" type="checkbox"/> Yes
		<input type="checkbox"/> No
If Yes above, provide:	Name of nfp in country	MAFFF Strategic Plan
	Starting year	Three Year (2005-2008)
	Current status	<input type="checkbox"/> In formulation
		<input type="checkbox"/> In implementation
		<input checked="" type="checkbox"/> Under revision
Reference to document or web site	<input type="checkbox"/> Process temporarily suspended	
Law (Act or Code) on forest with national scope		<input checked="" type="checkbox"/> Yes, specific forest law exists
		<input type="checkbox"/> Yes, but rules on forests are incorporate-rated in other (broader) legislation
		<input type="checkbox"/> No, forest issues are not regulated by national legislation
If Yes above, provide:	Year of enactment	1961
	Year of latest amendment	Proposed for 2009
	Reference to document	

In case the responsibility for forest policy- and/or forest law-making is decentralized, please indicate the existence of the following and explain in the comments below the table how the responsibility for forest policy- and law-making is organized in your country.		
Sub-national forest policy statements		Yes
	x	No
If Yes above, indicate the number of regions/states/provinces with forest policy statements		
Sub-national Laws (Acts or Codes) on forest		Yes
	x	No
If Yes above, indicate the number of regions/states/provinces with Laws on forests		

14.3 Comments to Table T14

Variable / category	Comments related to data, definitions, etc.
Forest policy statement with national scope	Final draft of the first National Forestry Policy for Tonga has been submitted for Ministerial approval.
National forest programme (nfp)	There is no nfp; but a forestry development programme in the Ministry Overall Strategic Plan.
Law (Act or Code) on forest with national scope	Forest Acts 1961 – considered for review this year (2009)
Sub-national forest policy statements	No sub-national forest policy statements.
Sub-national Laws (Acts or Codes) on forest	A study on the formulation of Forestry codes of practice is currently undertaken.

Other general comments to the table

15 Table T15 – Institutional framework

15.1 FRA 2010 Categories and definitions

Term	Definition
Minister responsible for forest policy-making	Minister holding the main responsibility for forest issues and the formulation of the forest policy.
Head of Forestry	The Head of Forestry is the Government Officer responsible for implementing the mandate of the public administration related to forests.
Level of subordination	Number of administrative levels between the Head of Forestry and the Minister.
University degree	Qualification provided by University after a minimum of 3 years of post secondary education.

15.2 Data for Table T15

Table 15a – Institutions

FRA 2010 Category	2008	
Minister responsible for forest policy formulation : please provide full title	Minister for Agriculture & Food, Forestry and Fisheries	
Level of subordination of Head of Forestry within the Ministry		1 st level subordination to Minister
	x	2 nd level subordination to Minister
		3 rd level subordination to Minister
		4 th or lower level subordination to Minister
Other public forest agencies at national level		
Institution(s) responsible for forest law enforcement	Forestry Division, Ministry of Agriculture & Food, Forestry and Fisheries	

Table 15b – Human resources

FRA 2010 Category	Human resources within public forest institutions					
	2000		2005		2008	
	Number	%Female	Number	%Female	Number	%Female
Total staff	5	0	3	0	3	0
...of which with university degree or equivalent	1	0	1	0	1	0

Notes:

1. Includes human resources within public forest institutions at sub-national level
2. Excludes people employed in State-owned enterprises, education and research, as well as temporary / seasonal workers.

15.3 Comments to Table T15

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Minister responsible for forest policy formulation		
Level of subordination of Head of Forestry within the Ministry		
Other public forest agencies at national level		
Institution(s) responsible for forest law enforcement	There is an overlap in the relevant Government Ministries' policy and legislation.	
Human resources within public forest institutions		

Other general comments to the table

16 Table T16 – Education and research

16.1 FRA 2010 Categories and definitions

Term	Definition
Forest-related education	Post-secondary education programme with focus on forests and related subjects.
Doctor's degree (PhD)	University (or equivalent) education with a total duration of about 8 years.
Master's degree (MSc) or equivalent	University (or equivalent) education with a total duration of about five years.
Bachelor's degree (BSc) or equivalent	University (or equivalent) education with duration of about three years.
Technician certificate or diploma	Qualification issued from a technical education institution consisting of 1 to 3 years post secondary education.
Publicly funded forest research centers	Research centers primarily implementing research programmes on forest matters. Funding is mainly public or channelled through public institutions.

16.2 National data

16.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Forestry, MAFFF	H	Qualification, number, gender,	2005	

16.2.2 Original data

The original data is based on the forestry staff and workforce.

16.3 Data for Table T16

FRA 2010 Category	Graduation ¹⁾ of students in forest-related education					
	2000		2005		2008	
	Number	%Female	Number	%Female	Number	%Female
Master's degree (MSc) or equivalent	0		0		0	
Bachelor's degree (BSc) or equivalent	0		0		0	
Forest technician certificate / diploma	4	0	2	100	3	67
FRA 2010 Category	Professionals working in publicly funded forest research centres ²⁾					
	2000		2005		2008	
	Number	%Female	Number	%Female	Number	%Female
Doctor's degree (PhD)	0		0		0	
Master's degree (MSc) or equivalent	0		0		0	
Bachelor's degree (BSc) or equivalent	0		0		0	

Notes:

1. Graduation refers to the number of students that have successfully completed a Bachelor's or higher degree or achieved a certificate or diploma as forest technician.
2. Covers degrees in all sciences, not only forestry.

16.4 Comments to Table T16

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Graduation of students in forest-related education	Training opportunities very limited. Some staff have been transferred to work on agriculture or retired.	
Professionals working in public forest research centres	No public forest research centre.	

Other general comments to the table

Lack of long term training opportunities in forestry.

17 Table T17 – Public revenue collection and expenditure

17.1 FRA 2010 Categories and definitions

Category	Definition
Forest revenue	All government revenue collected from the domestic production and trade of forest products and services. For this purpose, forest products include: round wood; sawn wood; wood-based panels; pulp and paper; and non-wood forest products. As far as possible, this should include revenue collected by all levels of government (i.e. central, regional/provincial and municipal level), but it should exclude the income of publicly owned business entities.
Public expenditure	All government expenditure on forest related activities (further defined below).
Operational expenditure (sub-category to Public expenditure)	All government expenditure on public institutions solely engaged in the forest sector. Where the forest administration is part of a larger public agency (e.g. department or ministry), this should only include the forest sector component of the agency's total expenditure. As far as possible, this should also include other institutions (e.g. in research, training and marketing) solely engaged in the forest sector, but it should exclude the expenditure of publicly owned business entities.
Transfer payments (sub-category to Public expenditure)	All government expenditure on direct financial incentives paid to non-government and private-sector institutions, enterprises communities or individuals operating in the forest sector to implement forest related activities.
Domestic funding	Public expenditure funded from domestic public financial resources, including: retained forest revenue; forest-related funds; and allocations from the national budget (i.e. from non-forest sector public revenue sources).
External funding	Public expenditure funded from grants and loans from donors, non-governmental organisations, international lending agencies and international organisations, where such funds are channelled through national public institutions.

17.2 National data

17.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Forestry, MAFFF	H	Budgets – operational funds	2000	
Biosecurity, MAFFF	H	Exports	2000	

17.2.2 Classification and definitions

National class	Definition
Forest revenue	Same as FRA 2010 categories and definition
Public expenditure	
Domestic funding	
External funding	

17.2.3 Original data

Original data was obtained from Ministry's Budget Estimates

17.3 Analysis and processing of national data

In previous, no significant change in the Forestry annual budgets.

17.3.1 Calibration

No calibration is needed.

17.3.2 Estimation and forecasting

No major change in Forestry budget allocation is expected.

17.3.3 Reclassification into FRA 2010 categories

17.4 Data for Table T17

Table 17a - Forest revenues

FRA 2010 Categories	Revenues (1000 local currency)	
	2000	2005
Forest revenue	150	50

Table 17b - Public expenditure in forest sector by funding source

FRA 2010 Categories	Domestic funding (1000 local currency)		External funding (1000 local currency)		Total (1000 local currency)	
	2000	2005	2000	2005	2000	2005
Operational expenditure	300	390	20	30	320	420
Transfer payments	20	40	50	70	70	110
Total public expenditure	320	430	70	100	390	530
If transfer payments are made for forest management and conservation, indicate for what specific objective(s) - Please tick all that apply.	<input checked="" type="checkbox"/>	Reforestation				
	<input checked="" type="checkbox"/>	Afforestation				
	<input checked="" type="checkbox"/>	Forest inventory and/or planning				
	<input checked="" type="checkbox"/>	Conservation of forest biodiversity				
	<input checked="" type="checkbox"/>	Protection of soil and water				
	<input checked="" type="checkbox"/>	Forest stand improvement				
	<input checked="" type="checkbox"/>	Establishment or maintenance of protected areas				
	<input type="checkbox"/>	Other, specify below				

17.5 Comments to Table T17

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Forest revenue	Main source is from export of forest product (sandalwood) but the volume is very limited. A ban on sandalwood export had been imposed for the protection and conservation of the resource.	
Operational expenditure	No major increase is expected in the current level of budget allocation to forestry development.	
Transfer payments	Some overseas funded projects are implemented by NGOs with small grant.	

Other general comments to the table