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**GLOBAL FOREST RESOURCES  
ASSESSMENT 2010**

**COUNTRY REPORTS**

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## The Forest Resources Assessment Programme

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

FAO, at the request of its member countries, regularly monitors the world's forests and their management and uses through the Forest Resources Assessment Programme. This country report forms part of the Global Forest Resources Assessment 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](http://www.fao.org/forestry/fra)).

The Global Forest Resources Assessment process is coordinated by the Forestry Department at FAO headquarters in Rome. The contact person for matters related to FRA 2010 is:

Mette Løyche Wilkie  
Senior Forestry Officer  
FAO Forestry Department  
Viale delle Terme di Caracalla  
Rome 00153, Italy

E-mail: [Mette.LoycheWilkie@fao.org](mailto:Mette.LoycheWilkie@fao.org)

Readers can also use the following e-mail address: [fra@fao.org](mailto:fra@fao.org)

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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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## Report preparation and contact persons

The present report was prepared by the following person(s):

<b>Name (FAMILY NAME, First name)</b>	<b>Institution / address</b>	<b>E-mail</b>	<b>Fax</b>	<b>Tables</b>
CHIRAMBO Kasizo	Department of Forestry, P.O Box 30048, Lilongwe 3, Malawi.	kasizochirambo@yahoo.com	+265 1 774 268 +265 1 771 761	1 to 17
MTAMBO Brian	Department of Forestry, P.O Box 30048, Lilongwe 3, Malawi	bmtambo@yahoo.co.uk	+265 1 774 268	1 to 17

## **Introduction**

The forest resources in Malawi seem to be declining steadily. The reasons for the decline are attributed to agriculture expansion, dependence on wood fuel for energy, high population growth and high levels of poverty. Although efforts are being made to replace the exploited forest resources through tree planting supported by both government and donors, the gap still remains big between the harvested areas and the area rehabilitated.

Fires remain one of the biggest problems that affects management of both natural woodlands and industrial softwood plantations as well as fuelwood and poles plantation.

The extrapolated and deduced figures in the report might not give a true picture of what is happening on the ground since the last Forest resources Mapping and Biomass Assessment for Malawi was done in 1990. Since then all FRAs have been relying on extrapolations, deductions and forecasts. The government strongly feels that it is high time to undertake, with an external support, another study that will assist it properly plan and manage the resources.

## 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
Department of Forestry, Ministry of Forestry and Natural Resources. 1993. Forest Resources Mapping and Biomass Assessment for Malawi . Implementing agency: Satellitbild	H	Growing Stock	1973 1991	

#### 1.2.2 Classification and definitions

National class	Definition
B	Built-up area. Urban areas around major cities, but also large infrastructural areas such as airports.
Ef	Agriculture in forest area Extensive agriculture (20-70% cultivated land). Forest is the natural vegetation in this class, broken frequently, however, by patches of cultivation, often smallholdings.
Eg	Agriculture in mainly grass area Extensive agriculture (20-70% cultivated land) Found only in the southernmost part of the country, in flood-prone areas around Elephant Marsh in the Shire river valley.
Fbf	Brachyteria in flat area. Forest, less than 20% open land. Non-evergreen forest

	with brachystegia as main species.
Fbh	Brachyteria in hilly area. Forest, less than 20% open land. Non-evergreen forest with brachystegia as main species.
Fe	Evergreen forest. Forest, less than 20% open land. Defined by property of having green leaves throughout the whole year, even during the dry seasons. The distribution of species is significantly different from that in brachystegia forest. Occurs in areas with high and evenly distributed rainfall, mainly at high altitude such as Mt. Mulanje, Nyika and Viphya. Often found near Brachystegia forest in hilly areas, but also common in open natural vegetation grass areas on high altitudes, giving a mottled pattern in the satellite imagery.
F1	Logged forest. Logged areas are normally smaller than 100 hectares, and these were therefore not mapped.
Fpe	Eucalyptus plantation. Forest, less than 20% open land. Plantations usually protected, owned and managed by government, but can also have private owners. The interpretation was concentrated on plantations larger than the smallest mapping unit 100 hectares. Numerous other private plantations within agricultural areas were too small to be mapped.
Fpg	Gmelina plantation. Found in the Lilongwe district only. Forest, less than 20% open land. Plantations usually protected, owned and managed by government, but can also have private owners. The interpretation was concentrated on plantations larger than the smallest mapping unit 100 hectares. Numerous other private plantations within agricultural areas were too small to be mapped.
Fpp	Pine plantation. Widely spread all over the country, mainly on high altitudes. Local knowledge of the locations of pine plantations proved important. Forest, less than 20% open land. Plantations usually protected, owned and managed by government, but can also have private owners. The interpretation was concentrated on plantations larger than the smallest mapping unit 100 hectares. Numerous other private plantations within agricultural areas were too small to be mapped.
Fpr	Rubber plantation. Relatively new plantation species. Found in the Nkhatabay district only. Forest, less than 20% open land. Plantations usually protected, owned and managed by government, but can also have private owners. The interpretation was concentrated on plantations larger than the smallest mapping unit 100 hectares. Numerous other private plantations within agricultural areas were too small to be mapped.
Fpt	Tung plantation. Found in areas around Mzuzu only. The extent of tung plantations has decreased during the last 20 yeras, remaining ones often existing side by side with other tree plantations. Accordingly, mapping units are complexes with tung plantations as predominant land cover. Forest, less than 20% open land. Plantations usually protected, owned and managed by government, but can also have private owners. The interpretation was concentrated on plantations larger than the smallest mapping unit 100 hectares. Numerous other private plantations within agricultural areas were too small to be mapped.
Ia	Arable land Intensive agriculture (more than 70% cultivated land) Dominates South and Central regions. Contains smallholder cultivation as well as plantations smaller than 100 hectares. Crop can be maize, ground nuts, cassava, cashew nuts, cotton ect. Small scattered forest patches and single trees occur.
Ipc	Coffee/Tea/Macademia Intensive agriculture plantations, larger than 100 hectares (more than 70% of total land area is cultivated land) Found in the Nkhatabay district, but mainly in the south of Malawi in large estates in the Thyolo and Mulanje districts. Larger field structure than in Arable land (Ia).
Ipl	Leucaena Intensive agriculture plantations, larger than 100 hectares (more than 70% of total land area is cultivated land). A shrub grown for agroforestry purposes. Found in the Machinga and Chikwawa districts only.

Ips	Sugar Intensive agriculture plantations, larger than 100 hectares (more than 70% of total land area is cultivated land). Large estates with characteristic field patterns in the Nkhotakota and Chikwawa districts
Ipt	Tobacco/Maize Intensive agriculture plantations, larger than 100 hectares (more than 70% of total land area is cultivated land). Small and large estates spread all over Malawi with a concentration on the Central region. Rotation cropping tobacco-maize. Large estates usually located in flat areas of existing or former <i>Brachystegia</i> forests. Often a characteristic pattern with long narrow strips, but irregular rectangular fields can also occur.
Ir	Rice scheme Intensive agriculture plantations, larger than 100 hectares (more than 70% of total land area is cultivated land). Irrigated paddy rice cultivation found in the Karonga district only. Identifiable by its shape of irrigated area in the dry surroundings.
M	Marshy area or swamp Found in all three regions. Waterlogged areas, usually with grass vegetation and often partly cultivated.
Nb	Bare rock Non-vegetated land. Small class, usually granite rock outcrops, occurring in all three regions.
Nr	River bed or beach Non-vegetated land. Small class, small narrow areas along lakes, beaches and rivers. Only in Nkhotakota and Salima districts were the beaches large enough to be mapped.
Od	Dambo (often cultivated) Areas along natural drainage patterns in flat and undulating areas. Dambos can be considered as riverbeds of intermittent rivers, prone to flooding during wet seasons and therefore uninhabited. the ground cover is grass, often used for grazing. Soil and moisture conditions make parts of the dambos favorable for cultivation in many cases, which is reflected in images by agricultural patterns. Open natural vegetation: contains more than 20% open land and less than 20% of its total area is under cultivation.
Og	Grass Found at high altitudes on mountain ridges and plateaus, in all three regions of Malawi. Open natural vegetation: contains more than 20% open land and less than 20% of its total area is under cultivation.
Os	Savanna Natural grassland with scattered trees. Found only in flat areas along the southwestern shores of Lake Malawi. Characterized by the lack of agricultural pattern in non-forested flat areas. Open natural vegetation: contains more than 20% open land and less than 20% of its total area is under cultivation.
Unclassed	Null
W	Water surface. Lakes and wide rivers.

### 1.2.3 Original data

National class	Original data (1000 ha)	
	1973	1991
B		22
Ef		2 433
Eg		235
Fbh	2 400	1 686
Fbf	1 913	733
Fe	88	83
Fl	-	5
Fpe	5	24
Fpg	1	1
Fpp	42	107
Fpr	-	3
Fpt	4	2
Ia		2 783
Ipc		44



Ipl		7
Ips		21
Ipt		244
Ir		7
M		177
Nb		16
Nr		0
Od		415
Og		311
Os		39
Unclassed	4 948	2
<b>Total Land Area</b>	<b>9 399</b>	<b>9 399</b>
W	2 423	2 423
<b>Total</b>	<b>11 822</b>	<b>11 822</b>

### 1.3 Analysis and processing of national data

#### 1.3.1 Calibration

FAOSTAT	Area ('000 ha)	Calibr. Factor
Land Area	9 408	1.0009398
Total Country Area	11 848	
Inland Water	2 440	
Country area according to data source ('000 ha)		11 821.9

After calibration, we get:

National class	Calibrated Area (in 1000 ha)	
	1973	1991
B	-	22
Ef	-	2 435
Eg	-	236
Fbh	2 402	1 687
Fbf	1 915	734
Fe	88	83
Fl	-	5
Fpe	5	24
Fpg	1	1
Fpp	42	107
Fpr	-	3
Fpt	4	2
Ia	-	2 786
Ipc	-	44
Ipl	-	7
Ips	-	21
Ipt	-	245
Ir	-	7
M	-	177
Nb	-	16
Nr	-	0
Od	-	415
Og	-	311
Os	-	39
Unclassed	4 952	2
<b>Total Land Area</b>	<b>9 408</b>	<b>9 408</b>

### 1.3.2 Reclassification into FRA 2010 categories

National class	FRA CLASSIFICATION			
	Forest	Other wooded land	Other land	Inland water
B			100%	
Ef	50%		50%	
Eg			100%	
Fbh	100%			
Fbf	100%			
Fe	100%			
F1	100%			
Fpe	100%			
Fpg	100%			
Fpp	100%			
Fpr	100%			
Fpt	100%			
Ia			100%	
Ipc			100%	
Ipl			100%	
Ips			100%	
Ipt			100%	
Ir			100%	
M			100%	
Nb			100%	
Nr			100%	
Od			100%	
Og			100%	
Os			100%	
Unclassed			100%	
W				100%

### 1.3.3 Estimation and forecasting

After reclassification, the following table is obtained:

	Area (1000 hectares)	
	1973	1991
Forest	4 456	3 863
OWL	-	-
OL	4 952	5 545
<b>Total Land area</b>	<b>9 408</b>	<b>9 408</b>
Water	2 440	2 440
<b>Total country area</b>	<b>11 848</b>	<b>11 848</b>

The amount of forest has been estimated by linear extrapolation for 1990, 2000, 2005 and 2010 after reclassification.

Area (1000 hectares)						
	1973	1991	1990	2000	2005	2010
Forest	4 456	3 863	3 896	3 567	3 402	3 237
Other wooded land	-	-				
Other land	4 952	5 545	5 512	5 841	6 006	6 171
Inland water bodies	2 440	2 440	2 440	2 440	2 440	2 440
<b>TOTAL</b>	<b>11 848</b>	<b>11 848</b>	<b>11 848</b>	<b>11 848</b>	<b>11 848</b>	<b>11 848</b>

#### 1.4 Data for Table T1

FRA 2010 categories	Area (1000 hectares)			
	1990	2000	2005	2010
Forest	3 896	3 567	3 402	3 237
Other wooded land	0	0	0	0
Other land	5 512	5 841	6 006	6 171
...of which with tree cover	n.a.	n.a.	n.a.	n.a.
Inland water bodies	2 440	2 440	2 440	2 440
<b>TOTAL</b>	<b>11 848</b>	<b>11 848</b>	<b>11 848</b>	<b>11 848</b>

#### 1.5 Comments to Table T1

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Forest		The amount of forest has been estimated by linear extrapolation for 2010.
Other wooded land	There is an unknown area of other wooded land which is included under the other categories. The definition of the national vegetation classes did not allow for a reclassification to other wooded land.	
Other land		
Other land with tree cover		
Inland water bodies		

**Other general comments to the table**

Due to absence of sufficient information, land use type Ef (Agriculture in forest area) was classified as 50% forest and 50% other land.

Other land with tree cover refers to land use class Ipl, which consists of leucaena, grown for agroforestry purposes in intensive agriculture plantations.

According to the original data source, estimations for plantations only included those larger than the smallest mapping unit of 100 hectares. Numerous other private plantations were too small to be mapped. For this reason, the plantation area (and thus the forest area) obtained in the original data is likely to be an underestimate.

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

Field inventory	n/a
Remote sensing survey / mapping	n/a

## **2 Table T2 – Forest ownership and management rights**

Statistical information and data relating to forest ownership and management rights is not available. However, forests are owned and managed by government (public), private institutions, individuals and local communities.

Ownership of trees coincides with ownership of the land on which they are situated. However, no inventory has been done to ascertain the sizes of the different categories

### 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.
<b>Categories of primary designated functions</b>	
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.
<b>Special designation and management categories</b>	
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
Department of Forestry, Ministry of Forestry and Natural Resources. 1993. Forest Resources Mapping and Biomass Assessment for Malawi . Implementing agency: Satellitbild	H	Forest reserves, proposed forest reserves, national parks, Blantyre fuelwood planning area	1991	

### 3.2.2 Classification and definitions

Same as for T1.

### 3.2.3 Original data

Data for 1991. Source: Department of Forestry, Ministry of Forestry and Natural Resources, 1993

Forest reserves	Area (ha)
Fe	34 292.2
Fbh	539 865.2
Fbf	59 893.3
Fl	4 817.4
Fpe	12 812.3
Fpp	102 317.5
Fpr	1.6
Fpt	5.4
Ef	14 589.1
Total	768 594

National Parks	Area (ha)
Fe	25 988.3
Fbh	128 643.0
Fbf	238 870.9
Fpp	762.1
Ef	4 189.9
Total	398 454

<b>Game Reserves</b>	<b>Area (ha)</b>
Fbh	208 985.0
Fbf	135 588.7
Ef	14 865.0
<b>Total</b>	<b>359 439</b>

<b>Proposed Forest Reserves</b>	<b>Area (ha)</b>
Fe	950.4
Fbh	105 119.9
Fbf	16 671.3
Ef	21 769.4
<b>Total</b>	<b>144 511</b>

<b>Blantyre Fuelwood Planning Area</b>	<b>Area (ha)</b>
Fbh	36 458.6
Fbf	3 558.9
Fpe	1 170.1
Ef	19 092.3
<b>Total</b>	<b>60 279.9</b>

Summarising the original data, we get:

<b>Type</b>	<b>Area (ha)</b>
Forests in Forest reserves	768 594
Forests in National Parks	398 454
Forests in Game Reserves	359 439
Forests in Proposed Forest Reserves	144 511
Forests in the Blantyre Fuelwood Planning Area	60 279.9

In addition to the above, the author also gives the following national figures for plantations:

<b>National Classification</b>	<b>CALIBRATED AREA ('000 ha)</b>	
	<b>1973</b>	<b>1991</b>
Fpe	4.63	24.07
Fpg	0.61	0.72
Fpp	41.63	107.39
Fpr	0.00	2.67
Fpt	3.79	1.71

Summarising, this gives:

<b>National Classification</b>	<b>CALIBRATED AREA ('000 ha)</b>	
	<b>1973</b>	<b>1991</b>
Forest Plantations	51	137



### 3.3 Analysis and processing of national data

#### 3.3.1 Calibration

FAOSTAT	Area ('000 ha)	Calibr. Factor
Land Area	9408	1.0009398
Total Country Area	11 848	
Inland Water	2 440	

Country area according to data source (1000 ha)	11 821.9
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After calibration of the original data :

Type	Area (ha)
Forests in Forest reserves	768 594
Forests in National Parks	398 454
Forests in Game Reserves	359 439
Forests in Proposed Forest Reserves	144 511
Forests in the Blantyre Fuelwood Planning Area	60 279.9

#### 3.3.2 Reclassification into FRA 2010 categories

	Production	Conservation of Biodiversity	No or unknown function
Forests in Forest reserves	100%		
Forests in National Parks	0.2%	99.8%	
Forests in Game Reserves		100%	
Forests in Proposed Forest Reserves			100%
Forests in the Blantyre Fuelwood Planning Area	100%		

The 0.2 percent of Forests in National Parks allocated to Production function, consist on a small area (762 ha) of pine plantations located within national parks.

### 3.3.3 Estimation and forecasting

A-

	Production (ha)	Conservation of Biodiversity (ha)	No or unknown function (ha)
Forests in Forest reserves	768 594		
Forests in National Parks	762.0	397 692	
Forests in Game Reserves		359 439	
Forests in Proposed Forest Reserves			144 511
Forests in the Blantyre Fuelwood Planning Area	60 279.9		
<b>Total</b>	<b>829 635.9</b>	<b>757 131</b>	<b>144 511</b>

Due to lack of more recent data, the area of production and conservation for natural forests are assumed constant for all reporting years.

Planted forest is estimated based on expert knowledge, based on the plantation activities and establishment (see comments).

National Classification	CALIBRATED AREA ('000 ha)	
	1973	1991
Forest Plantations	51	137

Linear interpolation total was done in order to obtain an estimate for 1990 for forest plantations (which is equal to 132 000 ha).

- for 2000, planted forest = 132 000 + 18 000 (annual planting) x 5 x 0,85 (rate of survival) – 1 100 (plantation harvesting) x 10 = 197 500 ha

(Assumption is made that planting effort during these ten years mainly equal to 18 000 ha, annually planting in 2000, multiplied by 5);

- for 2005, planted forest = 197 500 + 22 000 (annual planting) x 5 (years) x 0,85 (rate of survival) – 1 100 (plantation harvesting) x 5 = 285 500 ha;

- for 2010, planted forest = 132 000 + (22 000 (annual planting) x 2 (years) + 19 000 (annual planting) x 3 (years)) x 0,85 (rate of survival) – 1 100 (plantation harvesting) x 5 = 365 850 ha.

	1990	2000	2005	2010
Plantation (Production)	132	197	285	365
Natural forest (Production)	830	830	830	830
Sub-total Production	962	1027	1115	1195
Natural forest (Conservation)	757	757	757	757
Unknown	2177	1783	1530	1285
<b>TOTAL</b>	<b>3896</b>	<b>3567</b>	<b>3402</b>	<b>3237</b>

B -Area of permanent forest estate is the total area of forests in forest reserves, national parks and game reserves

Type	Area (ha)
Forests in Forest reserves	768 594
Forests in National Parks	398 454
Forests in Game Reserves	359 439
<b>Total</b>	<b>1 526 487</b>

The 1991 value was reported as 1990 value. It is assumed that the area remains table from 2000 to 2010.

### 3.4 Data for Table T3

**Table 3a – Primary designated function**

FRA 2010 Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010
Production	962	1 027	1 115	1 195
Protection of soil and water	0	0	0	0
Conservation of biodiversity	757	757	757	757
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	2 177	1 783	1 530	1 285
<b>TOTAL</b>	<b>3 896</b>	<b>3 567</b>	<b>3 402</b>	<b>3 237</b>

**Table 3b – Special designation and management categories**

FRA 2010 Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010
Area of permanent forest estate	1 526	1 526	1 526	1 526
Forest area within protected areas	757	757	757	757
Forest area under sustainable forest management	n/a	n/a	n/a	n/a
Forest area with management plan	n/a	n/a	n/a	n/a

### 3.5 Comments to Table T3

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Production		
Protection of soil and water		
Conservation of biodiversity	Total area of forests national parks and game reserves	
Social services		
Multiple use		
Other		
No / unknown designation		
Area of permanent forest estate	Area of permanent forest estate is the total area of forests in forest reserves, national parks and game reserves	

Forest area within protected areas	Total area of forests national parks and game reserves	
Forest area under sustainable forest management		
Forest area with management plan		

<b>Other general comments to the table</b>

## 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).
<b>Characteristics categories</b>	
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.
<b>Special categories</b>	
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
Department of Forestry, Ministry of Forestry and Natural Resources. 1993. Forest Resources Mapping and Biomass Assessment for Malawi . Implementing agency: Satellitbild	H		1973 1991	

## 4.2.2 Original data

From table T1

National class	Calibrated area ('000 ha)	
	1973	1991
Ef	-	2 435
Fbh	2 402	1 687
Fbf	1 915	734
Fe	88	83
F1	-	5

From table T3

National Classification	CALIBRATED AREA ('000 ha)	
	1973	1991
Forest Plantations	51	137

## 4.3 Analysis and processing of national data

### 4.3.1 Reclassification into FRA 2010 categories

	Primary	Other naturally regenerated
Ef		100%
Fbh	100%	
Fbf		100%
Fe		100%
F1		100%

### 4.3.2 Estimation and forecasting

After reclassification, we get:

	Area ('000 ha)	
	1973	1991
Primary forests	2402	1687

Values for 1990, 2000, 2005 and 2010 were calculated through linear intrapolation and extrapolation.

	Area ('000 ha)					
	1973	1991	1990	2000	2005	2010
Primary forests	2402	1687	1727	1330	1132	934

Planted forest is estimated based on expert knowledge, based on the plantation activities and establishment (see comments).

National Classification	CALIBRATED AREA ('000 ha)	
	1973	1991
Forest Plantations	51	137

Linear interpolation total was done in order to obtain an estimate for 1990 for forest plantations (which is equal to 132 000 ha).

- for 2000, planted forest = 132 000 + 18 000 (annual planting) x 5 x 0,85 (rate of survival) – 1 100 (plantation harvesting) x 10 = 197 500 ha

(Assumption is made that planting effort during these ten years mainly equal to 18 000 ha, annually planting in 2000, multiplied by 5);

- for 2005, planted forest = 197 500 + 22 000 (annual planting) x 5 (years) x 0,85 (rate of survival) – 1 100 (plantation harvesting) x 5 = 285 500 ha;

- for 2010, planted forest = 132 000 + (22 000 (annual planting) x 2 (years) + 19 000 (annual planting) x 3 (years)) x 0,85 (rate of survival) – 1 100 (plantation harvesting) x 5 = 365 850 ha.

#### 4.4 Data for Table T4

Table 4a

FRA 2010 Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010
Primary forest	1 727	1 330	1 132	934
Other naturally regenerated forest	2 037	2 040	1 985	1 938
...of which of introduced species	n/a	n/a	n/a	n/a
Planted forest	132	197	285	365
...of which of introduced species	132	197	285	365
<b>TOTAL</b>	<b>3 896</b>	<b>3 567</b>	<b>3 402</b>	<b>3 237</b>

Table 4b

FRA 2010 Categories	Area (1000 hectares)			
	1990	2000	2005	2010
Rubber plantations (Forest)	n/a	2.48	2.48	n/a
Mangroves (Forest and OWL)	0	0	0	0
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		
Other naturally regenerating forest		
Planted forest		<p>In the 1995, the average area for planted forests per year had been 18 000 ha. Then, in 2005, the average area for planted forests per year had reached 22 000 ha. But tree planting has decreased in recent years because of reduced donor support in afforestation and reforestation. Plantation activity is estimated to be 19 000 ha/year (between 2008 and 2010). (To be noted: the survival rate is 85 % and rate of harvesting : 1 100 ha/y).</p>
Rubber plantations		<p>Vizara Rubber Plantation covers an area of 2,480. However, the trees are over mature and are being sawn into timber (expert knowledge). It is difficult to know what will remain in 2010.</p>
Mangroves		
Bamboo		

Other general comments to the table



## 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
Department of Forestry, Tree Planting Returns		Seedlings	2000-2008	

#### 5.2.2 Original data

Original information is based on expert knowledge and internal forestry records on tree planting and plantation management.

### 5.3 Analysis and processing of national data

Based on expert knowledge and internal communication (Department of Forestry, Tree Planting Returns), it is assumed the following:

In the 2000, the average area for planted forests per year had been 18 000 ha.

Then in 2005, the average area for planted forests per year had reached 22 000 ha.

With a survival rate et 85 %

Annual forest establishment is, in 2000 : 15 300 ha, and in 2005: 18 700 ha.

Mainly planted species are exotic.

## 5.4 Data for Table T5

FRA 2010 Categories	Annual forest establishment (hectares/year)			...of which of introduced species <sup>1)</sup> (hectares/year)		
	1990	2000	2005	1990	2000	2005
Afforestation	n/a	15 300	18 700	n/a	15 300	18 700
Reforestation	n/a	1 500	2 000	n/a	1 500	2 000
...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	n/a	n/a	n/a	n/a

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		
Reforestation		
Natural expansion of forest		

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
Department of Forestry, Ministry of Forestry and Natural Resources. 1993. Forest Resources Mapping and Biomass Assessment for Malawi. Implementing agency: Satellitbild	H	Growing stock	1991	

#### 6.2.2 Classification and definitions

The data source does not give a clear definition of tree volume, but the procedure used for calculating volume of felled sample trees indicates that the volume figures refer to trees with diameter > 5 cm and includes stem and branches down to a minimum diameter of 2 cm.

#### 6.2.3 Original data

The data source provides the following data for natural forests for the reference year 1991:

Forest class	Volume (1000 m <sup>3</sup> )	Area (1000 ha)
<b>Fe</b> (Evergreen forest)	20 610	82.8
<b>Fbh</b> (Brachystegia forest in hilly areas)	188 152	1 689.6
<b>Fbf</b> (Brachystegia forest in flat areas)	65 760	734.7
<b>Total</b>	<b>274 522</b>	<b>2 507.1</b>

From these original data we can calculate the average volume of natural forest.  
Average volume = 109.5 m<sup>3</sup>/ha

### 6.3 Analysis and processing of national data

#### 6.3.1 Calibration

Given that surface area calibration has already been done for T1, no further calibration is necessary.

#### 6.3.2 Estimation and forecasting

The original data on growing stock only refer to natural forests, but as no other information is available on growing stock of planted forests, the average volume per hectare as above has been applied to the area reported as forest in table T1 for all four reference years.

### 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	427	391	373	354	n/a	n/a	n/a	n/a
... of which coniferous	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
... of which broadleaved	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Growing stock of commercial species	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

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 <sup>st</sup>					
2 <sup>nd</sup>					
3 <sup>rd</sup>					
4 <sup>th</sup>					
5 <sup>th</sup>					
6 <sup>th</sup>					
7 <sup>th</sup>					
8 <sup>th</sup>					
9 <sup>th</sup>					
10 <sup>th</sup>					
Remaining					
<b>TOTAL</b>					

Note: Rank refers to the order of importance in terms of growing stock, i.e. 1<sup>st</sup> 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 <sup>1</sup> of trees included in growing stock (X)	5 cm	
Minimum diameter (cm) at the top end of stem for calculation of growing stock (Y)	2 cm	
Minimum diameter (cm) of branches included in growing stock (W)	2 cm	
Volume refers to “above ground” (AG) or “above stump” (AS)	AS	

**6.5 Comments to Table T6**

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

Other general comments to the table

<sup>1</sup> 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.

## 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 Analysis and processing of national data

#### 7.2.1 Estimation and forecasting

The analysis is based on the growing stock data presented in table T6, to which the following formula and conversion factors have been applied:

$$\begin{aligned} \text{Above ground biomass (AGB)} &= \text{Growing stock} * \text{wood density} * \text{BEF} \\ \text{Below ground biomass (BGB)} &= \text{AGB} * 0.24 \end{aligned}$$

$$\begin{aligned} \text{Wood density} &= 0.58 \text{ Tons /m}^3 \\ \text{BEF} &= 1.2 \end{aligned}$$

(Note : same formula have been applied in the 2005 report)

Data for dead wood biomass has not been calculated.

### 7.3 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	297	272	260	246	n/a	n/a	n/a	n/a
Below-ground biomass	71	65	62	59	n/a	n/a	n/a	n/a
Dead wood	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>TOTAL</b>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

#### 7.4 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		

<b>Other general comments to the table</b>
<p>Whilst the biomass stock can be deduced from the growing stock, it is important that a comprehensive study on biomass be undertaken so as to give a true picture of the situation. Otherwise relying on extrapolation and deductions will not give a true picture of the situation on the ground.</p>

## 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 Original data

Biomass data from table T7 has been used as input for the carbon estimations.

Area data from table T1 has been used as input for the carbon stocks of litter and soil.

### 8.3 Analysis and processing of national data

#### 8.3.1 Estimation and forecasting

A/- Carbon stock is calculated by multiplying the biomass by 0.47. Carbon stocks of litter and soil have not been estimated.

B/- Carbon in the litter has been estimated, based on the standard factor of 2.8 (Subtropical), and

- Soil carbon has been estimated, based on the factor of 47 (tropical moist and LAC soils).

The biomass/ hectare values are then applied to the forest area values in table T1 to get the biomass for the reporting years.

Year	1990	2000	2005	2010
Total Forest area (1000 ha)	3 896	3 567	3 402	3 237
Carbon in the litter	10 909	9 988	9 526	9 064
Soil carbon	183 112	167 649	159 894	152 139



#### 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	140	128	122	116	n/a	n/a	n/a	n/a
Carbon in below-ground biomass	33	31	29	28	n/a	n/a	n/a	n/a
<b>Sub-total: Living biomass</b>	<i>173</i>	<i>159</i>	<i>151</i>	<i>144</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>
Carbon in dead wood	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Carbon in litter	11	10	10	9	n/a	n/a	n/a	n/a
<b>Sub-total: Dead wood and litter</b>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>
Soil carbon	183	168	160	152	n/a	n/a	n/a	n/a
<b>TOTAL</b>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>

Soil depth (cm) used for soil carbon estimates	30
--	----

#### 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 (supplementary term)	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
Department of Forestry, Forest Fire Records			2000-2008	

#### 9.2.2 Original data

Data reviewed by national expert and based on the Department of Forestry, Forest Fire Records.

Fires	Annual average for 5-year period					
	1990		2000		2005	
	1000 hectares	number of fires	1000 hectares	number of fires	1000 hectares	number of fires
on forest plantation	0.651	60.2	0.369	23.6	1.028	84.6

Note :Please see comments, information on fires is limited to plantation areas. All these fires are wildfires.

The area affected by fires does not mean that the trees were completely damaged. Depending upon the age and species some of the trees recovered. The area affected by fires increased due to the prolonged dry spells in some years and the non payment of benefits to retrenched workers. Mostly the recorded fires are those occurring in industrial softwood plantations. The number of fires reduced due to civic education conducted in the affected areas

### 9.3 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	n/a	n/a	n/a	n/a	n/a	n/a
... 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	n/a	n/a	n/a
Planned fire	n/a	n/a	n/a

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

### 9.4 Comments to Table T9

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Area affected by fire		
Number of fires		
Wildfire / planned fire		

#### Other general comments to the table

There has not been any study on forest fires in Malawi. However, all the data and information is recorded by the Forest Plantation Managers in their respective plantation units. Fires affecting other woodlands are not 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

Information of table T10b is provided by the Forestry research of Malawi

### 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
<b>Total area affected by disturbances</b>	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)
Cypress aphid	<i>Cupressus lusitanica</i>	1993	n/a	n/a
Leucaena psyllid	<i>Leucaena lucosphala</i>	1990	n/a	n/a
Armillaria melea	<i>Pinus</i>	1987	n/a	n/a
Die back	<i>Pinus</i>	1984	n/a	n/a
Thaumastocoris spp	<i>Eucalyptus</i>	2008	n/a	n/a

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)
	n/a
<b>Total forest area affected by woody invasive species</b>	n/a

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		
Disturbance by diseases		
Disturbance by other biotic agents		
Disturbance caused by abiotic factors		
Major outbreaks		
Invasive species		

#### Other general comments to the table

The country has no recent information on forest health.

## 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
Department of Forestry, Revenue Collection Records	M		2000-2008	
FAO stat	M	Industrial roundwood and Woodfuel	1988 - 2007	

#### 11.2.2 Original data

FAO Stat, Industrial roundwood

Year	1988	1989	1990	1991	1992
Vol m3 u.b.	363000	378000	422000	429000	476000
Vol m3 u.b.	Average 1990 : 413600				
Vol m3 o.b.	Average 1990 : 475640				

Year	1998	1999	2000	2001	2002
Vol m3 u.b.	509000	520000	520000	520000	520000
Vol m3 u.b.	Average 2000: 517800				
Vol m3 o.b.	Average 2000 : 595470				

Year	2003	2004	2005	2006	2007
Vol m3 u.b.	520000	520000	520000	520000	520000
Vol m3 u.b.	Average 2005 : 520000				
Vol m3 o.b.	Average 2005 : 598000				

FAO Stat, woodfuel

Year	1988	1989	1990	1991	1992
Vol m3 u.b.	4898173	5141863	5164443	5122063	5207139
Vol m3 u.b.	Average 1990 : 5106736				
Vol m3 o.b.	Average 1990 : 5872747				

Year	1998	1999	2000	2001	2002
Vol m3 u.b.	4881000	4922000	4964000	4996000	5029000
Vol m3 u.b.	Average 2000: 4958400				
Vol m3 o.b.	Average 2000 : 5702160				

Year	2003	2004	2005	2006	2007
Vol m3 u.b.	5064000	5102000	5140000	5189000	5240000
Vol m3 u.b.	Average 2005 : 5147000				
Vol m3 o.b.	Average 2005 : 5919050				

### 11.3 Data for Table T11

FRA 2010 Category	Industrial roundwood removals			Woodfuel removals		
	1990	2000	2005	1990	2000	2005
Total volume (1000 m <sup>3</sup> o.b.)	476	595	598	5873	5702	5919
... of which from forest	476	595	598	5873	5702	5919
Unit value (local currency / m <sup>3</sup> o.b.)	n/a	800	800	n/a	350	350
Total value (1000 local currency)	n/a	476000	478400	n/a	1995700	2071650

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	Malawi Kwacha	Malawi Kwacha	Malawi Kwacha

### 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		
Total volume of woodfuel removals		
Unit value		
Total value		

Other general comments to the table
<p>The country has information relating to wood removals. The removals are those recorded in the plantations units that sell wood. However, there are other removals that are done illegally both in the plantation units as well as the natural forests.</p>



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

There are a lot of Non-Wood Forest Products (such as: mushrooms, medicines, caterpillar, grass, honey, game meat, bamboo, ... ), that are removed from the forests. However, there has not been a comprehensive study that has been undertaken to determine the volumes removed and the value of the removals.

## 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
Lebedys, A. 2003. Trends and current status of the contribution of the forest sector to national economies (final draft).FAO, Rome	M	Employment in forestry, logging and related services	1990-2000	
Annual Economic Report 2008, Ministry of Economic Planning and Development	M		2008	

#### 13.2.2 Classification and definitions

National class	Definition
Log sales	Logs harvested by the department of forestry and sold by the roadside
Royalties	Sales of standing timber from state forests and forest reserves.
Log sales to Raiply	Sales of standing timber to Raiply Ltd.
Miscellaneous Receipts	This includes a variety of sales. The most important for 1990 being the royalties on wood from customary land and Viphya farm sales.

#### 13.2.3 Original data

Employment in forestry, logging and related services

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
808	821	911	921	921	927	938	955	975	996	996

### 13.3 Analysis and processing of national data

#### 13.3.1 Reclassification into FRA 2010 categories

Employment in forestry, logging and related services = 100% Primary production of goods.

#### 13.4 Data for Table T13

FRA 2010 Category	Employment (1000 years FTE)		
	1990	2000	2005
Employment in primary production of goods	0.808	0.996	0.996
...of which paid employment	0.808	0.996	0.996
...of which self-employment	n/a	n/a	n/a
Employment in management of protected areas	n/a	n/a	n/a

#### 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	Only paid employment is included	
Paid employment / self-employment		Since 2000, the paid employees remain stable, because the main employer, government, stopped recruiting lower level staff and especially labourers.
Employment in management of protected areas		

#### Other general comments to the table

Using data from the National Statistical Service of Malawi, data was calculated by taking the employment per cubic metre of round wood production for the year 2000 and using the production data in the years 1990-1999 to estimate the likely level of employment. For this reason, the data is considered to be an under-estimate. Data taken from the Malawi Government Annual Economic Report 2008. Some of the data is based on Lebedys's document

## 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)			
<b>Forest policy statement with national scope</b>	<input checked="" type="checkbox"/>	Yes	
	<input type="checkbox"/>	No	
If Yes above, provide:	Year of endorsement	1996	
	Reference to document	National Forest Policy	
<b>National forest programme (nfp)</b>	<input checked="" type="checkbox"/>	Yes	
	<input type="checkbox"/>	No	
If Yes above, provide:	Name of nfp in country	National Forestry Programme	
	Starting year	2001	
	Current status	<input type="checkbox"/>	In formulation
		<input checked="" type="checkbox"/>	In implementation
		<input type="checkbox"/>	Under revision
<input type="checkbox"/>		Process temporarily suspended	
Reference to document or web site	Malawi National Forestry Programme (2001)		
<b>Law (Act or Code) on forest with national scope</b>	<input checked="" type="checkbox"/>	Yes, specific forest law exists	
	<input type="checkbox"/>	Yes, but rules on forests are incorporated in other (broader) legislation	
	<input type="checkbox"/>	No, forest issues are not regulated by national legislation	
If Yes above, provide:	Year of enactment	1997	
	Year of latest amendment	2006	
	Reference to document	Forestry Act 1997, Forest Rules and Regulation Amendments 2006	

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.		
<b>Sub-national forest policy statements</b>	<input type="checkbox"/>	Yes
	<input checked="" type="checkbox"/>	No
If Yes above, indicate the number of regions/states/provinces with forest policy statements	All Districts	
<b>Sub-national Laws (Acts or Codes) on forest</b>	<input type="checkbox"/>	Yes
	<input checked="" type="checkbox"/>	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	
National forest programme (nfp)	
Law (Act or Code) on forest with national scope	
Sub-national forest policy statements	
Sub-national Laws (Acts or Codes) on forest	

Other general comments to the table
There are no sub national policies and laws. However, there are some sectoral policies and legislation which promote forestry like the Land Resources, Land Policy, Decentralisation Policy and Environmental Policy. The Forestry Act is regularly amended to cater for new trends in forestry management. In addition village level institutions make their own by laws that govern the management of their forest resources.

## 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 of Lands and Natural Resources
Level of subordination of Head of Forestry within the Ministry	1 <sup>st</sup> level subordination to Minister
	X 2 <sup>nd</sup> level subordination to Minister
	3 <sup>rd</sup> level subordination to Minister
	4 <sup>th</sup> or lower level subordination to Minister
Other public forest agencies at national level	Forest Governance Learning Group Parliamentary Committee on Agriculture and Natural Resources Forestry Research Institute of Malawi (FRIM) National Herbarium and Botanic Gardens of Malawi
Institution(s) responsible for forest law enforcement	Department of Forestry Department of National Parks and Wildlife Malawi Police Service Department of Environmental Affairs District Assemblies Ministry of Justice (Courts)

**Table 15b – Human resources**

FRA 2010 Category	Human resources within public forest institutions					
	2000		2005		2008	
	Number	%Female	Number	%Female	Number	%Female
Total staff	3 308	28	5 591	16	6 651	15
...of which with university degree or equivalent	32	21.8	40	25	45	26.6

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.
3. Data are based on information provided by the Human Resources Records.

### 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		
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 a 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
Department of Forestry, Human Resource Records			2009	

#### 16.2.2 Original data

Data are based on information provided by the Human Resources Records.



### 16.3 Data for Table T16

FRA 2010 Category	Graduation <sup>1)</sup> of students in forest-related education					
	2000		2005		2008	
	Number	%Female	Number	%Female	Number	%Female
Master's degree (MSc) or equivalent	13	15.4	2	50	2	50
Bachelor's degree (BSc) or equivalent	27	26	19	37	51	45.1
Forest technician certificate / diploma	77	15.6	113	17.7	56	21.4
FRA 2010 Category	Professionals working in publicly funded forest research centres <sup>2)</sup>					
	2000		2005		2008	
	Number	%Female	Number	%Female	Number	%Female
Doctor's degree (PhD)	2	0	2	0	1	0
Master's degree (MSc) or equivalent	4	0	3	0	3	0
Bachelor's degree (BSc) or equivalent	1	0	3	0	2	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. Information on graduated students covers within country and overseas education.
3. 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		
Professionals working in public forest research centres		

Other general comments to the table

## 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: roundwood; sawnwood; 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
Malawi Government – Budget Document			2005	

#### 17.2.2 Original data

Information, based on the Malawi Government – Budget Document.

### 17.3 Data for Table T17

**Table 17a - Forest revenues**

FRA 2010 Categories	Revenues (1000 local currency)	
	2000	2005
Forest revenue	73 000	164 330

**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	47 000	54 000	77 000	160 000	124 000	214 000
Transfer payments	n/a	n/a	n/a	n/a	n/a	n/a
<b>Total public expenditure</b>	47 000	54 000	77 000	160 000	124 000	214 000
If transfer payments are made for forest management and conservation, indicate for what specific objective(s) - Please tick all that apply. (see the comments)	<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				
Capacity building of communities and local forestry institutions in forestry management						

### 17.4 Comments to Table T17

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Forest revenue		
Operational expenditure	Operational expenditure excludes salaries for officers	The operational expenditure budget has mainly been incremental and not activity based
Transfer payments	Transfer payments exist but it is difficult to get the right figures, because of poor record keeping.	

Other general comments to the table