Forestry Department
Food and Agriculture Organization of the United Nations

GLOBAL FOREST RESOURCES ASSESSMENT 2010

COUNTRY REPORT

SUDAN

FRA2010/198
Rome, 2010

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).

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

Readers can also use the following e-mail address: fra@fao.org

Contents

Report preparation and contact persons

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

Name (FAMILY NAME, First name)	Institution / address	E-mail	Fax	Tables
Dr. Gaafar Abdalla	FNC, P.O.Box 658 Khartoum, Sudan	Abdalla_gaafar@yahoo.com		1, 10
Dr. Dawelbait Nagla	NCR, P.O.Box 10744, Khartoum, Sudan?	nagla.dawelbait@gmail.com		1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17
Mohammed Salah Yousif	FNC, P.O.Box 658 Khartoum, Sudan	salahyousifnc@yahoo.com		1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17
Mohamadein Lugman	FNC, P.O.Box 658 Khartoum, Sudan	lugman.fnc@gmail.com		1, 2
Ibrahim Hanady	FNC, P.O.Box 658 Kharttoum, Sudan	hanadyabdelgabbar@yahoo.com		1, 2, 3,4,6, 11, 13, 14, 15, 17
Lutana Denis	FNC, P.O.Box 658 Kharttoum, Sudan			1,2,3,4
El Mahi Salah	FNC, P.O.Box 658 Kharttoum, Sudan	elmahiyo@yahoo.com		1
El Amin Hassan	FNC, P.O.Box 658 Kharttoum, Sudan	hassanskeleton@yahoo.com		1
Abdel Magid T.D.		Talaat1957@yahoo.com		1,3,14, 15
Khalil, Sayeda	FNC, P.O.Box 658	Sayeda_khalil @yahoo.com		10

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

1.2 National data

1.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
World Bank 1983.	L	Forest and other woody areas	1972	Area of woodlands and other woody areas and their contribution to rural energy. Based on 1972 Landsat imagery
World Bank 1985. Sudan Forestry Sector Review	M	Forest cover	1976	Area of forest and woodland based on Landsat imagery from 1972 with some updates in 1982 and 1983. Reference year is set as 1976.
FNC 2000. Country Submission to FRA 2000.	M	Forest cover	1997	Partial inventory covering the northern part of the country only.
FAO (2003). Land Cover Atlas. Africover Eastern Africa. GCO/RAF/287/ITA	H	Land Cover 1990-2000. Complete	2000	Based on remote sensing. Based on remote sensing. Refer to Dawelbait *et al*. for details.
Dawelbait, N.; Yousif, S.; Branthomme, A.; Elmahi, A.G.; del Lungo, A. & AbdelNour, H. 2006. Estimating forest cover and forest cover change in Sudan. Forest Resources Assessment Working Paper 109. FAO, Rome	H/M	Forest cover Forest cover change	2000	Based on Africover for the estimate for 2000 and on data from 1972 (World Bank 1983) for change estimates.
FNC 2001-2008, Annual reports.	L/M	Plantation activities,	2000-2008	States forests data. Analytical study to estimate change rate after

		Regeneration, and loss estimates		Africover (2000)
FNC reports Cross check sheet by region	H	Displacement or additional loss in forest area	2000-2008	Only in Nothern and Central areas
Abdelsalam, A.A. (2007) Macro Sectoral Policies in Woodfuels Conservation Strategy NPC Nile Transboundary Environmental Action Project. Nile Basin Development Forum	M/H	Estimates of scenarios, total consumption, updates of 1994	2005-2010	According to different scenarios. Based on biomass consumption rates through the last four decades and the future consumption forecast.

1.2.2 Classification and definitions

National classification is similar to the FRA 2010 one.

1.2.3 Original data

2000. Source: Dawelbait *et al*. 2006. Estimating forest cover and forest cover change in Sudan. FAO Forest Resources Assessment Working Paper 109.

Region	**Forest in ha**	**OWL in ha**
Bgazal	14048291	4829122
Central	2698588	4795991
Eastern	2494136	6537548
Darfur	11559867	12911635
Kordofan	9920094	14241317
Equatoria	14256099	3356184
Upper Nile	15165707	6333033
Northern	314853	876306
Khartoum	33365	271865
Total	**70491000**	**54153000**

Note : Forest and OWL classes match the FRA definitions

Comparing the above estimate with the data from 1972 (World Bank 1983) gave an estimated forest change rate of minus 589,000 ha/yr. The two data sets were too incompatible to provide an estimate of change in the category "Other wooded land".

2000-2008. Source : FNC annual reports and cross check sheet by region

The data in the table below show the total area of forest regenerated within the period 2000-2008 through planting, sowing and natural regeneration i.e. including afforestation, reforestation, natural regeneration of existing forest lands and natural expansion of forests unto land not previous forested. The data on regeneration are only for forest species and exclude natural regeneration under existing tree cover.

The annual loss figures are based on estimates of biomass consumption per region and on replies to questionnaires sent to regions. They include areas which are cleared and then regenerated – even within the same period. They include both forests and other wooded land.

Region	Total regenerated forests ha	Annual regeneration ha/year	Annual loss of forest and other wooded land ha/year	Annual loss of forest ha/year (1)	Annual loss of other wooded land ha/year (2)
Bgazal	774466	96808	113958	64956	49002
Central	462327	57791	410844	234181	176663
Eastern	295299	36912	108693	61955	46738
Darfur	1225610	153201	251333	143260	108073
Kordofan	1503012	187877	165927	94578	71349
Equatoria	1764100	220513	87480	49864	37616
Upper Nile	786287	98286	76192	43429	32763
Northern	15743	1968	46833	26695	20138
Khartoum	334				
Total	**6827177**	**853356**	**1261260**	**718918**	**542342**

Notes: (1) Assuming that loss of forest and wooded land is subdivided as follows: 57 % for forest and 43% for OWL.

For the region of Khartoum, it has been considered that the forest and OWL areas remain stable. Woods have been mainly supplied by the neighbouring regions.

It has been noted that some regions of Sudan face additional losses of forest, due to desertification, war, infrastructures, etc.... These additional losses are summarized as follows

Region	Total additional loss of forest ha	Annual additional loss of forest ha/year
Bgazal		
Central		
Eastern		
Darfur	146248	18281
Kordofan	564661	70583
Equatoria	798542	99818
Upper Nile		
Northern		
Khartoum		
Total	**1509451**	**188681**

1.3 Analysis and processing of national data

1.3.1 Calibration

No need, the data presented above have already been calibrated

1.3.2 Estimation and forecasting

Based on the information above, the annual net loss of forest between 2000 and 2008 was: 718,918+188,681-853,356= 54,243 ha per year.

This figure is much less than the estimated change rate for 1990-2000. However, it is considered to more closely reflect the real change during this recent period.

There is currently no attempt to regenerate OWL. The estimated annual loss is 542,342 ha per year. However, there has also been a substantial increase in the area of mesquite (*Prosopis chilensis*) - an invasive species classified as OWL - of 149,420 ha/yr during the period 1996-2005 (see table T10). The net loss is, therefore estimated to be 542,342-149,420 = 392,922 ha/yr for the whole period of 1990-2010.

For 1990
- The figure from Dawelbait *et al.* has been used for forest.

- The estimate of OWL has been the result of the following formula
OWL in 2000 + (net annual loss of OWL x 10 (years))

For 2005
- The estimate of forest has been the result of the following formula
Forest in 2000 + Annual regeneration x 5 (years) - (annual forest consumption x 5 (years)) - (annual additional losses x 5 (years))

- The estimate of OWL has been the result of the following formula
OWL in 2000 - (net annual loss of OWL x 5 (years))

For 2010
- The estimate of forest has been the result of the following formula
Forest in 2000 + Annual regeneration x 10 (years) - (annual forest consumption x 10 (years)) - (annual additional losses x 10 (years))

- The estimate of OWL has been the result of the following formula
OWL in 2000 - (net annual loss of OWL x 10 (years))

This gives the following results (in ha):

	1990	**2000**	**2005**	**2010**
Forest	76381000	70491000	70219785	69948570
OWL	58082220	54153000	52188390	50223780

1.4 Data for Table T1

FRA 2010 categories	**Area (1000 hectares)**			
	1990	**2000**	**2005**	**2010**
Forest	76381	70491	70220	69949
Other wooded land	58082	54153	52188	50224
Other land	103137	112956	115192	117427
...of which with tree cover	n.d.a.	n.d.a.	n.d.a.	n.d.a.
Inland water bodies	12981	12981	12981	12981
TOTAL	**250581**	**250581**	**250581**	**250581**

1.5 Comments to Table T1

Variable / category	**Comments related to data, definitions, etc.**	**Comments on the reported trend**
Forest	The data for 2000 is based on a detailed analysis of AfriCover.	The change rate for 1990-2000 is based on data from 2000 and 1972 and may be partly due to a difference in methodology. It is considered to be an over-estimate, but there is currently no data to make a better estimate for this period. A comprehensive study was made to report

		the changes in the forest areas from 2000 to 2008 by means of collecting this information from the forest officers in each state. The collected information was completed from the annual report documents in the same period.
Other wooded land	The data for 2000 is based on a detailed analysis of AfriCover.	The change rate for OWL is based on an assumption that the total loss of forest and OWL is proportional to the area of the two classes. Some OWL may have been converted into Forest during this period. There is a substantial increase in the area of *Prosopis chilensis*– an invasive species – which outweighs some of the loss of OWL in terms of area.
Other land		
Other land with tree cover		
Inland water bodies		

Other general comments to the table

Expected year for completion of ongoing/planned <u>national</u> forest inventory and/or RS survey / mapping	
Field inventory	2012
Remote sensing survey / mapping	2010/2011

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 *(sub-category of Private ownership)*	Forest owned by individuals and families.
Private business entities and institutions *(sub-category of Private ownership)*	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 *(sub-category of Private ownership)*	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 *(sub-category of Private ownership)*	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
FNC annual reports. 2002, 2003, 2004, 2005. FNC.	M	Community Forests	from 2000 to 2005	
Gum Arabic Producer's Union. Reports and interviews	M	Report, area, population	2005	
Population data sheet for Sudan by States-2002. Bureau of Statistics	M	% of rural and urban population	2002	
Gum Arabic Records	M	Report	1980 2002	
National forestry statistics	H	Private forest areas	2005	

2.2.2 Classification and definitions

National class	Definition
Central Forests	Forests owned by the Central Government (Federal) Institution FNC.
Community forests (Social Forests)	Forests owned by groups of rural population(villagers)
Regional (State forests)	Forests owned by state governments and administrated by the central government
Individual private forests (Community)	Forests owned by individuals (one or many)
Institution forests	Forests owned by agricultural schemes, farmer unions, companies. They may be private or public.

2.2.3 Original data

2002, Source : Sudan population data sheet 2002

- Private ownership by regions

Region	State(s)	Rural population number	Rural population %	Private forests in hectares	Remarks
North	Nothern Nile			n/a	
Khartoum	Khartoum			n/a	
Kordofan	North Kordofan, South Kordofan and West Kordofan	3087080	71	808020	Est.
Dar fur	North Darfur, South Darfur and West Darfur	5055300	82	646416	Est.
Eastern	Gedaref, Kassala	2116820	68	848421	Est.

	and Redsea				
Central	Gezira, Sennar, Blue Nile and White Nile	2310060	68	428416	Est.
Upper Nile	Jonglei, Upper Nile and Wahda	1154400	78	085000	Est.
Bahr el Ghazal	Buhairat, North Bahr el Ghazal, Warab and West Bahr el Ghazal			n/a	
Equatoria	Bahr el Jabal, East Equatoria and West Equatoria			n/a	
Total 1				**2 816 273**	

- Private ownership by forest type

Type of Forest	**Private forests in hectares**	**Remarks**
Community Forests	053965	Est.
Social forests	010602	An. Report 2002
Other private forests	001210	An. Report 2003
Total 2	**65 777**	

2005. Source: States and FNC statistics

- Private forest owned by gum farmers (societies)

State	**Number of Societies**	**Membership**	**Forest area (ha)**
Blue Nile	347	24 795	1 236 974.7
White Nile	036	02 600	230 717.22
Sennar	088	06 241	322 242.85
Gedarif	035	02 975	692 063.86
N. kordofan	142	18 500	682 320.58
S. Kordofan	540	29 700	1 035 689.9
W. Kordofan	156	14 285	1 113 114.7
Darfur Region	n.a	n.a	692 988.65
Total			**6 006 112**

- Private forest owned by rural individuals and communities

State	**Individual Forests ha**	**Community Forests ha**	**Total ha**
Gedarif	7 990	45 256	53 246
Sinnar	0 768	2 534	3 302
Blue Nile	10 192	97 370	107 562
Gezira	0	45	45
N. Darfur	132	4 110	4 242
W. Dar fur	284	0	284
S. Darfur	0	158	158
Khartoum	4		4
N. Kordofan	22 269	5 359	27 628
W. Kordofan	0	0	0

S. Kordofan	0	0	0
White Nile	13	1 775	1 788
Northern	0		59
Nile	0	48	48
Red Sea	0	0	0
Total	41 652	156 714	198 366

- Private forest owned by companies

Agricultural Scheme	**Planted Forests Before 2005 ha**	**New planted forests after 2005 ha**	**Total**
Gineid Sugar Company	199	25	224
Rahad Agric. Corporation	378	336	714
Gezira Agric. Scheme	429	76	505
Gezira Farmers Union	4 202	863	5 065
Kenana Sugar Company	2 311	840	3151
Assalaya Sugar Company	420	210	630
New Halfa corporation	n.a	13	13
Agricultural Schemes 10%	n.a	126	126
Tree Belts	n.a	3 668	3 668
Rahad Irrigated planted forests	n.a	129	129
Saudi Scheme	n.a	1 197	1 197
Acacia Company (Gandeil)	12 773	13 845	26 618
Acacia Company (Gandeil)	84 034	0	84034
Total	**104 746**	**21 328**	**126 074**

2.3 Analysis and processing of national data

2.3.1 Estimation and forecasting

- For 1990 and 2000 (2002, Source : Sudan population data sheet 2002)

Total sum of Private forest = Total 1 + Total 2 = 2 882 050 hectares
The estimated total area of private forests equals 2 882 050 ha. In fact, this area includes both forests and other wooded land and equals approximately 2.31% of the total area of forest and OWL for the year 2000 (124 645 (000) ha in table T1). Due to lack of other information, this percentage has been applied to the areas of forest for reporting year 2000 in table T1 and has been kept at the same level for 1990. The remaining area of forest is publicly owned.

- For 2005 (2005, Source: States and FNC statistics)

Forests owned by individuals = 41 652 ha
Forests owned by gum Arabic farmers in societies = 6 006 112 ha
Total individual forests = 41 652 + 6 006 112 = 6 047 764 ha

Forests owned by groups (Community) = 156 714 ha
Private forest owned by companies = 126 074 ha

Private ownership owned by individuals = 6 047 764 ha
Private ownership owned by private business entities and institutions = 126 074 ha
Private ownership owned by local communities = 156 714 ha
Total private ownership = **6 330 552**

Public ownership = Total Forest Area – Private ownership = **63 889 000** ha

2.4 Data for Table T2

Table 2a - Forest ownership

FRA 2010 Categories	Forest area (1000 hectares)		
	1990	2000	2005
Public ownership	74617	68863	63889
Private ownership	1764	1628	6331
...of which owned by individuals	n/a	n/a	6048
...of which owned by private business entities and institutions	n/a	n/a	126
...of which owned by local communities	n/a	n/a	157
...of which owned by indigenous / tribal communities	n/a	n/a	0
Other types of ownership	0	0	0
TOTAL	**76381**	**70491**	**70220**

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?	X	Yes
		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	74617	68863	63889
Individuals	0	0	0
Private corporations and institutions	0	0	0
Communities	0	0	0
Other	0	0	0
TOTAL	**74617**	**68863**	**63889**

2.5 Comments to Table T2

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Public ownership	All public forest areas are owned by FNC	
Private ownership	For 1990 and 2000, the original data figures are only estimated for the private ownership as complete information is lacking. Private ownership national data was improved by the new statistical records made after the establishment of the gum Arabic societies network.	The private ownership is increasing
Other types of ownership		
Management rights		

Other general comments to the table
- New records are expected from the land and resource tenure in different parts of the country.

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 sustain-able 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
FAO (2003). Land Cover Atlas. Africover Eastern Africa. GCO/RAF/287/ITA	H	Land Cover 1990-2000. Complete	2000	
Talaat Dafa Alla Abdul Majid. 2001. Biodiversity in Forests and its Impact on non-wood Forest Products. Forests National	M	Protected areas	2001	

Corporation.				
Prof. Mahdi Bashir. 2001. Sudan Country Study on Biodiversity. Higher Council for Environment and Natural Resources. HCENR	H		2001	
Anon. 2001. Forestry Outlook Study for Africa (FOSA Sudan Outlook Working Paper). Forests National Corporation FNC. Sudan	H		2001	
www.wcmc.org	M	Protected areas	2003	

3.2.2 Classification and definitions

National class	Definition
Forest reserves	Forest reserves are all forest areas registered in the government gazette as Forest National Corporation assets. According to Badi *et al* (1989), forest reserves are those areas where the cutting of trees is concentrated and replanting made immediately after felling.

3.2.3 Original data

- For Table T3a, the basic information is taken from Africover classification, which indicates that:
- 50.0 % of the forest area is for Production;
- 3.4 % of the forest area is for Protection of soil and water;
- 17.0% of the forest area is for Conservation of biodiversity;
- The remaining 29.6% is unknown.

- Original data for table T3b

- Natural reserves. Source: General Wild Life Administration

S.No	Type	Number	Date of reservation	Area ha	Ecological zone
1	National parks	11	1935,1990, 2002,2003	10 943 400	Semi-desert, Savannah, Sud-Swamps
2	Protected areas & bird Reserves	03	1939	95 500	Semi-desert, River habitat.
3	Reserved areas (usually around national parks and protected areas to protect the available habitat)	12	1935, 1939, 1946	3 272 033	Desert-scrub, Semi-desert, Savannah, Tropical Forest, Rain forest Swamps
4	Miscellaneous: Bird reserves, national parks marine and mountainous, dam bird reserves, national parks … etc	23	Proposed to be registered	2 939 000	Miscellaneous
	Total with proposed			17 249 933	

Excluding the desert area, semi-desert area, marine areas and dam bird reserves, which are not forested gives the following result:

- Forests areas within protected areas Year 2003

Protected areas with forests	Number of category	Area ha	Reason for inclusion
1) National Parks	07	8 612 100	Forests, rain forests, swamps
2) Bird Reserves	01	1 500	Riverine forest
3) Reserved Areas	10	2 526 000	Savannah forests, rain forests, swamps
4) Proposed Natural reserves	08	2 206 000	Savannah forests, rain forests, swamps
Total	26	13 345 600	

- Forest reserves

Reservation up to the Year	Number of reserved forests with management plans	Area of reserved forests with management plans ha	No. of reserved forests without management plans	Area of reserved forests without management plans ha	Total number of reserved forests	Total area of reserved forests ha
2005	1 400	5 079 369	1 233	5 984 694	2 633	11 064 063
2006	1 502	5 224 002	1 343	5 989 932	2 845	11 213 933
2007	1 623	5 544 209	1 602	6 493 727	3 225	12 037 936
2008	n.a	n.a	n.a	n.a	n.a	n.a

3.3 Analysis and processing of national data

3.3.1 Estimation and forecasting

For Table T3a, the percentages related to the different functions have been applied for the different years.

For table T3b,
- Area of permanent forest estate.
According to the national forest law, it is said that at least 25% of the total land area, (which means 59 400 000 ha) should be kept as permanent forest.

- Forest area with protected areas is 11 139 600 ha in 2000 and 2005. It is assumed that the proposed areas will be included by 2010, giving 13 345 600 ha.

- Forest area under sustainable forest management
In 2005, it is assumed to be equal to: Total area of private ownership (data for table T2a) + Total area of forest reserves + Total area of forest in protected area, giving: 6 330 552 + 11 064 063 + 11 139 600 = 28 534 215 ha

In 2010, it is considered that:
Area of forest reserves in will increase according to a linear extrapolation, based on the data of 2005 and 2007, which means 486 937 ha/year starting from 12 037 936 ha in 2007; and
Private ownership remains at least at 6 330 552 ha
The proposed protected areas will be included by 2010, giving 13 345 600 ha of forest in protected areas.

Expected sustainable forest management should be, in 2010: (12 037 936 + 486 937 x 3) + 6 330 552 + 13 345 600 = 33 174 899 ha.

- Forest area with management plan
In 2005, it is considered to be equal to: Total area of reserves with management plan + Total area of forest within protected areas in categories 1 and 2, giving: 5 079 369 + 8 613 600 = 13 692 969ha

In 2010, it is considered that:
Area of forest reserves with management plan will increase according to a linear extrapolation, based on the data of 2005 and 2007, which means 232 420 ha/year, starting from 5 544 209 ha in 2007.
The proposed protected areas will be included by 2010, but may not have a management plan by then, so the same figure as for 2005 (categories 1 and 2) is used, giving 8 613 600 ha of forest in protected areas.

In the 2010, it is expected to have (5 544 209 + 232 420 x 3) + 8 613 600 ha of forest areas with a management plan = 14 855 069 ha.

3.4 Data for Table T3

Table 3a – Primary designated function

FRA 2010 Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010
Production	38191	35246	35110	34975
Protection of soil and water	2597	2397	2387	2378
Conservation of biodiversity	12985	11983	11937	11891
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	22608	20865	20786	20705
TOTAL	**76381**	**70491**	**70220**	**69949**

Table 3b – Special designation and management categories

FRA 2010 Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010
Area of permanent forest estate	59400	59400	59400	59400
Forest area within protected areas	n/a	11140	11140	13346
Forest area under sustainable forest management	n/a	n/a	28534	33175
Forest area with management plan	n/a	n/a	13693	14855

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		
Social services		
Multiple use		
Other		
No / unknown designation		

Area of permanent forest estate	The national forest law and policy indicate that at least 25% of the total land area (59 400 000ha) should be kept as permanent forest. The target of FNC is to complete the reservation and registration of this above percentage.	
Forest area within protected areas	In 2000, it is known to be 11 139 600 ha. It is assumed that the proposed Natural Reserves of 2 206 000 will be included by 2010.	
Forest area under sustainable forest management	Assumed to be equal to: Total area of forest under private ownership + Total area of forest reserves + Total area of forest in protected areas	
Forest area with management plan	Equal to total area of forest reserves with management plan + Total area of forest within protected areas with a management plan (National Parks and Bird Reserve (the Sunt Forest of Khartoum))	It is expected to have the forest areas with management plans constantly increased.

Other general comments to the table
It is estimated that: - 50.0 % of the forest area is for Production; - 3.4 % of the forest area is for Protection of soil and water; - 17.0% of the forest area is for Conservation of biodiversity; - The remaining 29.6% is unknown.

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 outside 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
Bayoumi, Al Houri and Badey, 1989. The forests of the Sudan. Forests National Corporation. Sudan.	M	Forest characteristics		
Anon. 2002-2007. Annual Reports. Forests National Corporation. Sudan.	H	Forest characteristics		
FOSA/FNC records.	M			
Anon. 2003. Interviews and reports of States Forest Directors. 2008. FNC. Sudan.	M	Forest characteristics		
FNC Eastern Technical Sector.2008Mangrove survey and mapping	H	Mangrove forest and OWL	2005	

4.2.2 Classification and definitions

National class	Definition
Forests Plantations	The planting by seeds and seedlings in natural, reserved, irrigated schemes and institutions, private and community forests. It includes all the planting.
Official planting	Planting by seedlings and seeds done in FNC annual programs.
Community planting	Planting by individuals and groups.

Note: The above definitions are established by the national task force working on FRA. There are no official definitions.

4.2.3 Original data

Information is based on interviews and reports from state forest departments.

- From 2000 to 2008, plantation areas of introduced species (the below data derived from states documents)

State/region	Total Plantation of introduced species 2000-2008, in ha	Plantation of introduced species 2000 in ha **
White Nile	1 097	2731
Sinnar	n/a	
Blue Nile	115	
Gezira	617	2188
Total Central	***1 829***	
West Dar fur	1 645	
North Dar fur	25	
South Dar fur	45	
Total Dar fur	***1 715***	
Gedarif	122	
Kassala	555	
Red Sea	0	
Total Eastern	***677***	
North Kordofan	0	
West Kordofan	0	
South Kordofan	12	
Total Kordofan	***12***	
Khartoum	***n/a***	n/a
Northern	***4***	
South	***n/a***	n/a
Total	**4 237***	**4919**

Notes: * It is estimated that the annual rate of planting (for the introduced species) is 4237/8 = 530 ha/y.
** Gezira scheme and Kenane Sugar.

- From 2002 to 2008, total forest plantations (extracted from the annual reports, 2002, 2003, 2004, 2005, 2006 and 2007)

Type of planting	Annual planting					
	2002	**2003**	**2004**	**2005**	**2006**	**2007**
Official (In and outside the forest reserves) in ha	21 008	10 268	12 605	12 158	13 377	42 213
Private and community in ha	17 647	10 606	5 147	5 750	42 294	55 853
Institutions and schemes in ha	n/a	3 068	n/a	1 063	395	3 976
Total in ha	**38 655**	**23 942**	**17 752**	**18 971**	**56 066**	**102 042**

- Mangrove status, reference year 2005

Forest name	Area Covered by Mangrove in ha
Kalaneet	49.02
Damat	14.47
Ashat	131.49
Setrab	80.69
Marsa Alshekh Saad	32.23
Handob	20.91
Gib north	129.30
Almalaha	639.82
Remaining areas (OWL), mapping in process	886.07
Total	**1984.00**

4.3 Analysis and processing of national data

4.3.1 Estimation and forecasting

- Estimation of Primary forest is 20% of the total forest area

- Planted forest

Planted forests for the year 2000 is the same of that reported in FRA 2005 where it was estimated to be 8 % of the total forest area or 5 639 000 ha.

To estimate the planted forests 1990, the annual plantation rate has been established of 21,500 ha per year (See Table T5).

- Planted forests 1990: 5639000- 10 x 21500 = 5424000 ha

To estimate the planted forests 2005 and 2010, the annual plantation rate has been established (based on the reference years 2002-2007) : 257428/6 = 42904.67 ha/year

then,
- Planted forests 2005 =Planted forest 2000 + 5 x annual plantation
- Planted forests 2005 = 5639000 + 5 x 42904.67 =5853523.35 ha

- Planted forests 2010 = Planted forest 2000 + 10 x annual plantation
- Planted forests 2010 = 5639000 + 10 x 42904.67 = 6068046.7 ha

- Planted forest with introduced species:
In 2000, the estimated area is 4919 ha. Then, for the following years, it is considered that the area increases by 530ha/y.
  - Planted forests of introduced species 2005 =4919+5 X 530 = 7569 ha
  - Planted forests of introduced species 2010 =4919+10 X 530 = 10219 ha

No data is available for 1990.

- Estimation of Mangroves:
  - For the years1990 no data is available.
  - For the year 2000 = 1 984 + 840 = 2 824 ha, (using the reference year 2005 and knowing that the amount of 840 ha has been removed for new salt industry in the red sea coast between 2000 and 2005)
  - For the years 2005 = 1 984 ha (original data from the survey)
  - For the years 2010 = 1 984 ha (expected to have same amount as 2005 due to conservation policy)

- Estimation of Bamboo:
  - For the years1990 no data is available.
  - For the year 2000 = no data is available.
  - For the year 2005 = 30 000 ha (Estimate from bamboo expert)
  - For the year 2010 = 31 000 ha (FRA national experts estimate based on management plans)

- Estimation of other naturally regenerated forest is the remaining area.

4.4 Data for Table T4

Table 4a

FRA 2010 Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010
Primary forest	15276	14098	14044	13990
Other naturally regenerated forest	55681	50754	50322	49891
...of which of introduced species				
Planted forest	5424	5639	5854	6068
...of which of introduced species	n/a	5	8	10
TOTAL	**76381**	**70491**	**70220**	**69949**

Table 4b

FRA 2010 Categories	Area (1000 hectares)			
	1990	2000	2005	2010
Rubber plantations (Forest)	0	0	0	0
Mangroves (Forest and OWL)	n/a	3	2	2
Bamboo (Forest and OWL)	n/a	n/a	30	31

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		
Rubber plantations		
Mangroves	The mangrove species is found in 11 forests in the red sea coast. The available data regarding the extent of forest area covered by mangrove is an output of a recent survey dataset prepared for an ongoing study (by FNC) for mangroves mapping in the Sudan.	
Bamboo		

Other general comments to the table
In forest areas, important introduced species include Eucalypts, Mexican cedar, Ailanthus; Prosopis. Natural regeneration is observed in limited area within Mexican cedar plantations (Marra mountain) and in large areas within *Prosopis spp* population.

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
FNC. Annual Reports. 2002-2008	H	- Annual planting program.	2002-2007	
Directors of State Forests, 2008, The required questionnaire data for FRA.	M	-Expansion of forests -Regeneration of forests -Planted forests	2008	

5.2.2 Classification and definitions

National class	Definition
Official planting	The annual programme of planting in and outside the forest reserves through delegation and assistance of FNC.
Institutions and schemes planting	The annual planting of institutions and schemes through technical assistance and employment of FNC.
Community and individual planting	The annual planting programme performed by individuals and groups (Community).
Mutual benefit planting	It is a "Taungya" system, based on a one-year contract between FNC and the local farmers.

5.2.3 Original data

Data extracted from the Annual Reports: 2002, 2003, 2004, 2005, 2006 and 2007.

Type of planting	**Year**					
	2002	**2003**	**2004**	**2005**	**2006**	**2007**
Official (In and outside the forest reserves) in ha	21 008	10 268	12 605	12 158	13 377	42 213
Private and community in ha	17 647	10 606	5 147	5 750	42 294	55 853
Institutions and schemes in ha	n.a	3 068	n.a	1 063	395	3 976
Total	**38 655**	**23 942**	**17 752**	**18 971**	**56 066**	**102 042**

Estimates of Natural Regeneration per year (based on table T1):

State	Central	Dar fur	Kurdofan	Eastern	Northern	Bgazal	Equatoria	U. Nile	Total
Area ha	57 791	153 201	187 876	36 912	1 968	96 808	220 513	98 286	853 355

5.3 Analysis and processing of national data

5.3.1 Estimation and forecasting

- **Afforestation**: is composed of private, community, institutions and schemes.

a- For 1990, national expert estimate: 10 500 ha/y;

b- For 2000, there is no record available from 1998 to 2001. Only data available (17 647 ha/y) is for 2002, which is adopted as the average for 2000;

c- For 2005, the following is considered:

Type of planting	**Year**				
	2003	**2004**	**2005**	**2006**	**2007**
Private and community in ha	10 606	5 147	5 750	42 294	55 853
Institutions and schemes in ha	3 068	n.a	1 063	395	3 976
Total	**13 674**	**5 147**	**6 813**	**42 689**	**59 829**

giving an average for 2005 of : 25 630.4 ha/y.

- **Afforestation of introduced species**

From table T4, it is estimated (since 2000) that the annual rate of planting (for the introduced species) is 530 ha/y (this information is based on annual report and expert knowledge).

- Reforestation: Is composed of official planting.

a- For 1990, national expert estimate: 11 000 ha/y

b- For 2000, there is no record available from 1998 to 2001. Only data available (21 008 ha/y) is for 2002, which is adopted as the average for 2000;

c- For 2005, the following is considered:

Type of planting	**Year**				
	2003	**2004**	**2005**	**2006**	**2007**
Official (In and outside the forest reserves) in ha	10 268	12 605	12 158	13 377	42 213

giving an average for 2005 of 18 124.2 ha/y.

- Natural expansion of forest:

It is estimated that about 10 % of the natural regenerated forests could be considered as a natural expansion of forest. Therefore it is equal to 85 335.5 ha/y

The assumption is

- For 1990, 2000 and 2005, natural expansion of forest : 85 339.7 ha/y

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	10 500	17 647	25 630	n/a	530	530
Reforestation	11 000	21 008	18 124	n/a	n/a	n/a
...of which on areas previously planted	n/a	n/a	n/a	0	0	0
Natural expansion of forest	85 340	85 340	85 340	0	0	0

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	It is estimated that about 10 % of the natural regenerated forests could be considered as a 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
FAO 2003. Wood volume and woody biomass: Review of FRA 2000 estimates. FRA WP 69.	M	Volume per hectare per region	1995	The working paper contained information on the mean volume per hectare calculated with the information of the Handbook of Forestry Sector (FAO 1995).
FAO. 1995. *Handbook of Forestry Sector Statistics Sudan*. Forestry development in the Sudan (GCP/SUD/047/NET).	M	Productive forests, Semi-natural forests	1995	Data provided by the document were used to compile the working paper FAO 2003.
Anon. 1998. National Forest Inventory for Sudan. Forest National Corporation of Sudan and FAO (GCP/SUD/047/NET), Khartoum, Sudan.	M	Growing stock. Partial (1995)	1995	
J. K. Jackson.1960. Forest management in the Sudan. FAO, Rome & the Government of the Sudan, Expanded Technical assistance Program.	L	Forest resources in Sudan. Volume estimates in South Sudan. Partial data.	1960	

6.2.2 Original data

- For table T6a, as in FRA 2005, the mean value of 13.9 m3/ha was used for the forest.
Based on the national expertise, it is estimated that the Vol/ha of the OWL is about 8 m3/ha

- For table T6b

The partial inventory from 1995 gives the following growing stock in m3 of the 10 most common species by sector:

Scientific name	Sector							TOTAL
	RNS	ES	CS	KS (W/N)	DS	SS	SKS	million m3
Balanites aegyptica	51 200	102 900	1 275 302	6 331 681	14 497 991	18 122 488	283 001	**40.66**
Acacia seyal	6 400	735 000	9 413 650	3 113 942	2 899 592	3 624 490	565 999	**20.36**
Anogeissus leiocarpus	-	21 000	331 725	3 840 528	3 690 398	4 612 998	720 366	**13.22**
Albizzia amara	-	-	22 113	7 681 060	1 449 799	1 812 249	283 000	**11.25**
Acacia senegal	-	63 000	184 291	2 179 757	790 760	988 450	154 356	**4.36**
Acacia tortilis	128 000	189 000	538 132	1 660 766	395 393	494 241	77 181	**3.48**
Ziziphus spina-christi	-	-	530 761	311 392	790 796	988 495	154 363	**2.78**
Khaya senegalensis	-	-	-	311 392	890 968	1 113 710	317 200	**2.63**
Acacia nilotica	6 400	6 300	184 291	103 797	263 593	329 491	51 454	**0.95**
Isoberlinia doka	-	-	-	-	32 000	400 000	6 246	**0.44**

6.3 Analysis and processing of national data

6.3.1 Estimation and forecasting

- For table T6a, the mean volume of 13.9 m3/ha was applied to the total forest area of table T1 to calculate the growing stock for 1990, 2000, 2005 and 2010.

	1990	2000	2005	2010
Forest area (1000 ha)	76381	70491	70220	69949
Forest GS (1 000 m3)	1061696	979825	976058	972291

- For table T6a, the mean volume of 8 m3/ha was applied to the total OWL area of table T1 to calculate the growing stock for 1990, 2000, 2005 and 2010.

	1990	2000	2005	2010
OWL area (1000 ha)	58082	54153	52188	50224
OWL GS (1 000 m3)	464658	433224	417507	401790

- For table T6b

To estimate the GS for 1990 and 2005, the assumptions are the followings :

1 Proportion of total GS versus GS of the 10 most common species remains the same (10.217%);

2 Importance of GS among species maintain the same percentages.

Category / Species name			Growing stock in forest (million cubic meters)		
Scientific name	Common name	Proportion (%)	1990	2000	2005
Balanites aegyptiaca	Higleeg	12.66	134.45	124.08	123.61
Acacia seyal	Talih	6.34	67.31	62.12	61.89
Annogeissus leiocarpus	Sahab	4.12	43.70	40.33	40.18
Albizia amara	Arad	3.50	37.19	34.32	34.19
Acacia senegal	Hashab	1.36	14.42	13.31	13.25
Acacia tortilis	Seyal	1.08	11.52	10.63	10.59
Ziziphus spina-christi	Sidir	0.86	9.18	8.47	8.44
Khaya senegalensis	Mahogany	0.82	8.71	8.04	8.00
Acacia nilotica	Sunut	0.29	3.13	2.88	2.87
Isoberlinia doka	Bu	0.14	1.45	1.34	1.33

Total (10)	31.18	331.05	305.52	304.35
Remaining	68.82	730.64	674.30	671.71
TOTAL	**100.00**	**1061.70**	**979.82**	**976.06**

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	1062	980	976	972	465	433	418	402
... 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
1st	*Balanites aegyptiaca*	Higleeg	134.45	124.08	123.61
2nd	*Acacia seyal*	Talh	67.31	62.12	61.89
3rd	*Anogeissus leiocarpus*	Sahab	43.70	40.33	40.18
4th	*Albizzia amara*	Arad	37.19	34.32	34.19
5th	*Acacia senegal*	Hashab	14.42	13.31	13.25
6th	*Acacia tortilis*	Seyal	11.52	10.63	10.59
7th	*Ziziphus spina-christi*	Sidir/Nabag	9.18	8.47	8.44
8th	*Khaya senegalensis*	Mahogany	8.71	8.04	8.00
9th	*Acacia nilotica*	Sunt	3.13	2.88	2.87
10th	*Isoberlinia doka*	Bu	1.45	1.34	1.33
Remaining			**730.64**	**674.30**	**671.71**
TOTAL			**1062**	**980**	**976**

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)	15	
Minimum diameter (cm) at the top end of stem for calculation of growing stock (Y)	10	
Minimum diameter (cm) of branches included in growing stock (W)	5	
Volume refers to "above ground" (AG) or "above stump" (AS)	AG	

[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		
Growing stock of broadleaved / coniferous		
Growing stock of commercial species		
Growing stock composition		

Other general comments to the table

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
FAO. Working Paper 143. 2008. FAO Forestry Department	M	-Bio-mass expansion factors. -Root-shoot ratios	2006-2008	Derived from IPCC corrections

7.2.2 Classification and definitions

The FRA definitions are used.

7.2.3 Original data

From the table T6

7.3 Analysis and processing of national data

7.3.1 Estimation and forecasting

The following formula have been used
- Above Ground Biomass: GS x WD x BEF
- Below Ground Biomass: AGB x R

With WD = 0.70, BEF = 3.40, and R = 0.28

	Forest				OWL			
	1990	**2000**	**2005**	**2010**	**1990**	**2000**	**2005**	**2010**
Area (1000 ha)	76,381	70,491	70,220	69,949	58,082	54,153	52,188	50,224
a) Growing stock (million m3)	1062	980	976	972	465	433	418	402
b) Wood density	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
c) BEF	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40
d) AGB (a*b*c) million t	**2,527**	**2,332**	**2,323**	**2,314**	**1,106**	**1,031**	**994**	**956**
e) Root ratio	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
BGB (d*e) million t	**708**	**653**	**650**	**648**	**310**	**289**	**278**	**268**

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	2527	2332	2323	2313	1106	1031	994	956
Below-ground biomass	708	653	650	648	310	289	278	268
Dead wood	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
TOTAL	**n/a**	**n/a**	**n/a**	**n/a**	**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
FAO. Working Paper 143. 2008. FAO Forestry Department	M	Carbon fraction Carbon in soil. Carbon in liter.	2006-2008	

8.2.2 Classification and definitions

The FRA definitions are used.

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 2.1 t C /ha, and
- Soil carbon has been estimated, based on the factor of 35 t C/ha.
The biomass/ hectare values are then applied to the forest area values in table T1 to get the results for the reporting years.

	Forest				OWL			
	1990	**2000**	**2005**	**2010**	**1990**	**2000**	**2005**	**2010**
Area	76,381	70,491	70,220	69,949	58,082	54,153	52,188	50,224
AGB million t	2,527	2,332	2,323	2,314	1,106	1,031	994	956
BGB million t	708	653	650	648	310	289	278	268
Conv factor	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47
Carbon in AGB million t	1,188	1,096	1,092	1,088	520	485	467	449
Carbon in BGB million t	333	307	306	305	146	136	131	126
Total carbon (living biomass)	1,520	1,403	1,398	1,392	665	620	598	575

Carbon in litter (t/ha)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Carbon in litter (million t)	160	148	147	147	122	114	110	105
Carbon in soil (t/ha)	35	35	35	35	35	35	35	35
Carbon in soil (million t)	2,673	2,467	2,458	2,448	2,033	1,895	1,827	1,758

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	1,188	1,096	1,092	1,088	520	485	467	449
Carbon in below-ground biomass	333	307	306	305	146	136	131	126
Sub-total: Living biomass	***1,520***	***1,403***	***1,398***	***1,392***	***665***	***620***	***598***	***575***
Carbon in dead wood	ND	ND	ND	ND	ND	ND	ND	ND
Carbon in litter	160	148	147	147	122	114	110	105
Sub-total: Dead wood and litter	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***
Soil carbon	2,673	2,467	2,458	2,448	2,033	1,895	1,827	1,758
TOTAL	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**

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
Just like the biomass, research on carbon is not familiar in FNC. A joint work between FNC and Forest Research Corporation could help to obtain new and interesting results.

9 Table T9 – Forest fires

No data available. In the country, all the fires are wild.

9.1 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	100 %	100 %	100 %
Planned fire	0 %	0 %	0 %

9.2 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	In the country, all the fires are wild.	

Other general comments to the table
Fires are important. Wild (unplanned) fires even affect the states with high rainfall. They are active (from December until June, of the following year), during the dry season (when the tall grasses dry up). Fires cover all the Southern States (South Kordofan, South Darfur, Blue Nile,White Nile and Sennar). There is a newly established fire section in FNC but still at its beginnings. At the present time, there is lack of recorded data on forest fires.

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
Hashim A. El Atta, Sayda A. Khalil, Abdelazim M. Ibrahim. 2004, Mortality of *Khaya senegalensis* in South Kordofan State, Journal of Sudan Silva.	L	Dieback diseases	2004	
El Khalifa, M.D., Samani, M. O. E., Abdel Nour, H. O. et al. 1989. Gum Arabic rehabilitation in The Republic of The Sudan, Stage I Report, Volume 2: Main Report and Recommendations for Action, Institute of Environmental Studies, University of Khartoum, Sudan		Locust insects	1989-2000	
El Khalifa, M.D., Samani, M. O. E., Abdel Nour, H. O. et al. 1989.Gum Arabic rehabilitation in The Republic of The Sudan, Stage I Report, Volume 3: Literature Review, Institute of Environmental Studies, University of Khartoum, Sudan.	M	Locust insects	1989-2000	
El Atta, H. A.,(1988). *Sphenoptera chalcichroa arenosa* Ob.(Col.,Buprestidae) associated with the die-back of Acacia nilotca	M	Locust insects and Dieback diseases	1988-2000	

(L.wild.ex Del.) in The Sudan, Verlag Paul Parey, Hamburg und Berlin.				
El Atta,H. A., and El Bashier, E. M., (1995). The effect of tree locust defoliation on gum Arabic production by hashab trees (Acacia Senegal). Juornal of Agricultural Science, 3 (2) 111 – 121.	M	Locust and cricket	1995-2002	
Abdel Magid, 2007, An Approach Towards management In Sudan, The case of Kassala State, Ph.D Thesis, University of Khartoum.	H	- Mesquite area (1996 and 2007); - Hazard classification	1996-2007	

10.2.2 Original data

In the Annex 2, general presentation of the main biotic agents affecting the Sudanese forest

The insects' disturbance affects the gum belt area and reduces the production (based on the above reports)

Description / name	**Tree species or genera affected (scientific name)**	**Year(s) of latest outbreak**	**Area affected (1000 hectares)**	**If cyclic, approx. cycle (years)**
Sphenoptera chalcichroa arenosa	*Acacia nilotica*	2009	4.2	1
Anacredium melanorhodon melanorhodon	*Acacia senegal*	1994	5000	15

Total area of mesquite (*Prosopis chilensis*) - 2007 (Source : Abdel Magid, 2007)

State and location	**Area (ha) 1996**	**Area (ha) 2005**
Gash Delta	4 200	500 000
Halfa	9 044	242 000
Tokar Delta	140 560	650 000
Red Sea	20 860	050 000
Gedarif	2 100	n.a
Khartoum	5 111	13 000
River Nile	3 360	28 000
Norhern State	n.a	n.a
White Nile	11 008	60 000
Gezera	8 000	08 000
Kordofan	1 260	n.a
Darfur	294	n.a
Sennar	420	n.a
Total	**206 217**	**1 551 000**

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

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)
Sphenoptera chalcichroa arenosa	*Acacia nilotica*	2009	4.2	1
Anacredium melanorhodon melanorhodon	*Acacia senegal*	1994	5000	15

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)
Prosopis chilensis	1551
Total forest area affected by woody invasive species	

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 comprehensive data is available.	
Disturbance by diseases	No comprehensive data is available.	

Disturbance by other biotic agents	No comprehensive data is available.	
Disturbance caused by abiotic factors	Abiotic factors as wind fall is not serious, nevertheless it happens.	
Major outbreaks		
Invasive species	Invasive species is *Prosopis chilensis* "mesquite", which spreads widely and threatens the agricultural lands.	

Other general comments to the table
In Sudan, no infection diseases have been identified, except in 2002 (about 151 fed of *khaya senegalensis* trees in Dalang forest reserve have been infected by *Fusarium oxysporum* (fungi). Dieback: occurred in riverine forests, mainly caused by salinity (accumulated after floods). It is estimated that a total area of 10000 fed have been affected. It appears that secondary diseases (wood borer) the dieback area, due to Buprestidae, Bostrichidae. (Note: feddan = 1.038 acres) In the Annex 2, general presentation of the main biotic agents affecting the Sudanese forest is found. Nevertheless, disturbances by insects and diseases are not serious and no outbreaks in the forests.

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
FNC. Annual Reports 2000-2008.	H	-Round wood removals. -Fuel wood removals.	2000-2008	
FRA 2005. Wood removal.	M	Industrial& round wood removal	2005	

11.2.2 Original data

	Wood Removal under bark in cubic meters	
Year	Industrial Roundwood	Wood Fuel
1988	1 735 000	16 043 540
1989	1 773 000	15 965 830
1990	1 809 000	16 286 247
1991	1 749 000	16 521 308
1992	1 784 000	16 261 849
Avg 1990	**1 770 000**	**16 215 755**
1998	2 131 000	16 421 949
1999	2 173 000	16 548 511
2000	2 173 000	16 680 060
2001	2 173 000	16 871 138
2002	2 173 000	17 068 332
Avg 2000	**2 164 600**	**16 717 998**
2003	2 173 000	17 271 816
2004	2 173 000	17 481 780
2005	2 173 000	17 698 406
2006	2 173 000	17 901 275
2007	2 173 000	18 110 300
Avg 2005	**2 173 000**	**17 692 715**

11.3 Analysis and processing of national data

11.3.1 Calibration

Converting wood removal under bark to over back by multiplying by the conversion factor of 1.15.

FRA 2005 Categories	Wood Removal over bark in cubic meters		
	1990	2000	2005
Industrial Roundwood	2 035 500	2 489 290	2 498 950
Wood Fuel	18 648 118	19 225 698	20 346 622

Based on the national knowledge, the wood removal appears too high for the forest only. It is probably extracted from both forests and other wooded lands. Based on national expert estimates, 57 % of wood removal came from the forest.

11.4 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.)	2036	2489	2499	18648	19226	20347
... of which from forest	1160	1419	1424	10629	10959	11598
Unit value (local currency / m^3 o.b.)	15	15	12	10	10	8
Total value (1000 local currency)	30540	37335	29988	186480	192260	162776

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	SDG	SD	SD

11.5 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

Name of local currency:
SDG=Sudanese Gineih (pounds) 1990
SD= Sudanese Dinars 2000 and 2005
- 160 000 SDG in the year 1990 is equivalent to 16 000 SD in the year 2000, and 160 SDG in the year 2005.
- 24 000 SD in the year 2000 is equivalent to 240 000 SDG in the year 1990 and 240 SDG in the year 2005.
- 120 SDG in the year 2005 is equivalent to 12 000 SD in the year 2000 and 120 000 SDG in the year 1990.

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
Plant products / raw material
1. Food
2. Fodder
3. Raw material for medicine and aromatic products
4. Raw material for colorants and dyes
5. Raw material for utensils, handicrafts & construction
6. Ornamental plants
7. Exudates
8. Other plant products
Animal products / raw material
9. Living animals
10. Hides, skins and trophies
11. Wild honey and bee-wax
12. 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
Annual Report. 2005. FNC.	M	NWFPs	2005	

12.2.2 Original data

Information extracted from national reports and based on expert knowledge.

- Gums include -*Acacia nilotica*, -*Acacia seya*, -*Boswellia papyrifera*, and -*Sterculia sategira*.
Price of ton = 220 000 SD.
- Fruits: reports and estimates of subsistence for human, wild and domestic animals.
- Fodder: estimate on consumption of camels, goats and wild life.

12.3 Data for Table T12

Rank	Name of product	Key species	Unit	NWFP removals 2005		NWFP category
				Quantity	Value (1000 local currency)	
1st	Gums (Arabic, talih, kakamout and Luban)	Acacia gums & Luban gum	ton	50	11 000 000	7
2nd	Living animals		Unit	664	132 384	9
3rd	Wild honey and bee-wax		ton	1.350	297 000	1
4th	Hides, skins and trophies		Unit	1 389	5 626	10
5th	Fruits	Many species	ton		4 400	1
6th	Fodder	estimate	n/a	n/a	n/a	2
7th	Raw material for utensils, handicrafts and construction	Bamboo, Saaf, bark of trees	n/a	100	n/a	5
8th	Other plant products		n/a	n/a	n/a	8
9th	Raw material for medicine and aromatic products	*Acacia nilotica* pods	ton	1.000	n/a	3
10th	Ornamental plants	A lot of species (uncountable)	n/a	n/a	n/a	6
All other plant products						
All other animal products						
TOTAL						

	2005
Name of local currency	Sudanese Dinar (SD)

12.4 Comments to Table T12

Variable / category	Comments related to data, definitions, etc.
10 most important products	The 10 most important products have been selected according to the status known by the Sudanese FRA team. The information on the quantities is not accurate.
Other plant products	A lot of plant products (such as bark or root) is used by local communities for food, energy and tribal medicine.

Other animal products	
Value by product	Values are estimates.
Total value	

Other general comments to the table
There are no organized records for NWFPs. Existing information reflects only the quantities sold and therefore data are underestimated.

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 wage or salary in cash or in kind.
Self-employment	Persons who during a specified reference period performed some work for profit or family gain 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
FNC. Annual reports 2002-2007.	H	Employment	2002-2007	
Knowledge of the national FRA 2010 team	M	Employment	2002-2007	

13.2.2 Original sources

Primary production of goods

No.	Activity/Production of	FNC (paid) years FTE	Other/Contractor (Self) years FTE
1	Industrial round wood	1 000	3 000 000
2	Wood-fuel	100	1 000 000
3	Non-wood forest products	n/a	1 111 100
4	Silvicultural activities	1 000	n/a
5	Support services(1)	100	n/a
	Total	**2 200**	**5 111 100**

(1) Support services include: **Forest inventories**, **forest management consulting services**, **timber value assessment**, **forest fire fighting and protection**, **forest pest control**, **harvesting and transport of logs within the forest**.

Year	Employment			
	Paid employment Salary/wage(casual labour)	Self-employment	Primary employment	Employment in management of protected areas
2002	4876			
2003	4804			
2004	2395			
2005	2805			
2006	4770			
2007	3198			

Source: Annual Reports 2002-2007.

13.3 Analysis and processing of national data

13.3.1 Estimation and forecasting

For 2005:
Paid =2 805 + 2 200=5 005 = >5 005 years FTE
Primary =5 111 100 + 5 005 = >5 116 105 years FTE

For 1990 and 2000:

Considering the activities conducted for the wood exploitation (woodfuel and industrial roundwood removals), it is assumed that increase or decrease of the wood removals means a parallel increase or decrease of employment.

For 1990, 2000 and 2005, the respective wood removals (in millions m3) are 18.0, 18.9 and 19.8.

Therefore

Primary employment:
In 1990 = (5 116 105/19.8) x 18.0 = 4 651 005 years FTE
In 2000 = (5 116 105/19.8) x 18.9 = 4 883 555 years FTE

Self-employment (the proportion of self-employment versus employment remains stable):
In 1990 = (5 111 100/ 5 116 105) x 4 651 005 = 4 646 455 years FTE
In 2000 = (5 111 100/5 116.105) x 4 883 555 = 4 878 777 years FTE

The results are :

Year	Employment			
	Paid employment Salary/wage(casual labor) 1000 years FTE	Self-employment 1000 years FTE	Primary employment	Employment in management of protected areas
1990	4.550	4 646.455	4 651.005	n/a
2000	4.778	4 878.777	4 883.555	n/a
2005	5.005	5 111.00	5 116.105	n/a

13.4 Data for Table T13

FRA 2010 Category	Employment (1000 years FTE)		
	1990	2000	2005
Employment in primary production of goods			
...of which paid employment	4.55	4.78	5.00
...of which self-employment			
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		
Paid employment / self-employment	Paid employment is the employment paid by FNC. Self-employment (a wide community-based activity) is difficult to assess as the majority of which was not under the supervision of FNC. Estimations were established and they may be weak.	Paid employment is usually stable due to the limited resource available for new recruitment. It should be note that in 2003/2004, permanent positions of 1062 have been cancelled. There is no substitute for the retirees Self-employment is actually related to the living conditions of poor population. There is an increasing in the years of poor crops production and decreasing in the years of good crops production.
Employment in management of protected areas		

Other general comments to the table
Generally in our country, paid employment is paid by the government and the institutions concerned with growing trees (schemes). Self employment (as described in this report) comprises an important sector, though neglected; millions of people are self employed and benefit from forests. The results of this table are not fully dependant on accurate records, they are estimates based on practical observations and may be close to a true status.

14 Table T14 – Policy and legal framework

14.1 FRA 2010 Categories and definitions

Term	Definition
Forest policy	Forest policy is the 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 the society.
Forest law	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)			
1. Forest policy statement with national scope		X	Yes
			No
If Yes above, provide:	Year of endorsement	2005	
	Reference to document	-The Statement of Forest Policy 1986. Revised Forest Policy Statement of Sudan 2005.	
2. National forest programme (nfp)		X	Yes
			No
If Yes above, provide:	Name of nfp in country	National Forest Programme of Sudan	
	Starting year	1986	
	Current status		In formulation
		X	In implementation
			Under revision
			Process temporarily suspended
	Reference to document or web site	For more information, contact Forest National Corporation Library Unit, Khartoum	
3. Law (Act or Code) on forest with national scope		X	Yes, specific forest law exists
			Yes, but rules on forests are incorporated in other (broader) legislation
			No, forest issues are not regulated by national legislation
If Yes above, provide:	Year of enactment	2002	
	Year of latest amendment		
	Reference to document	Forests and Natural Resources Act	

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.		
4. Sub-national forest policy statements	X	Yes
		No
If Yes above, indicate the number of regions/states/provinces with forest policy statements	For one region: The Government of Southern Sudan	
5. Sub-national Laws (Acts or Codes) on forest	X	Yes
		No
If Yes above, indicate the number of regions/states/provinces with Laws on forests	For six states: Khartoum, Blue Nile, Gadarif, Southern Kordofan, Northern Kordofan and River Nile.	

Explanatory notes to the reporting table:

1. The national forest policy document or statement describes the objectives, priorities and means for implementation of the forest policy. It is endorsed when it is officially recognised as a government policy or instruction. The endorsement is formalised by the Minister in charge of forests by a dated and signed document.
2. The term "national forest programme" is a generic expression referring to a wide range of approaches towards forest policy formulation, planning and implementation at national and sub-national levels and providing a framework and guidance for country-driven forest sector development in consultation and participation of all stakeholders and in consistence with policies of other sectors and international policies.
3. The term "law on forest" refers to a Law (Act or Code) providing specific rules on forests and forest sector management, such as access, management and use of forest resources. The Law is enacted when the legislative authority adopted its text.
4. Same as (1) but the policy documents or statements refer to sub-national administrative units, e.g. States in a Federation or Autonomous Regions or Provinces.
5. Same as (3) but indicate if specific Laws on forests exist at sub-national level (at the level of regions/states/provinces).

14.3 Comments to Table T14

Variable / category	Comments related to data, definitions, etc.
Forest policy statement with national scope	Forest policy 1932 and the revised Forests National Corporation Policy 1986 were superseded by the Revised Forest Policy Statement of Sudan 2005.
National forest programme (nfp)	
Law (Act or Code) on forest with national scope	The first Forest Law was enacted in 1932. It was updated in 1989. The Forests and Natural Resources Act was enacted in 2002 and continues up to date. New corrections have been proposed but not yet approved.
Sub-national forest policy statements	
Sub-national Laws (Acts or Codes) on forest	

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

FRA 2010 Category	2008	
Minister responsible for forest policy formulation : please provide full title	Federal Minister of Agriculture and Forests	
Level of subordination of Head of Forestry within the Ministry	X	1st level subordination to Minister
		2nd level subordination to Minister
		3rd level subordination to Minister
		4th or lower level subordination to Minister
Other public forest agencies at national level	No	
Institution(s) responsible for forest law enforcement	Forests National Corporation, Ministry of Interior, and Ministry of Justice.	

Table 15b

FRA 2010 Category	Human resources within public forest institutions					
	2000		2005		2008	
	Number	%Female	Number	%Female	Number	%Female
Total staff	4876	n/a	2988	20.52	3100	23.84
...of which with university degree or equivalent	n/a	n/a	336	45.24	418	52.15

Note: 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		
Human resources within public forest institutions		

Other general comments to the table
Information on the staff refers to the staff of FNC. For 2000, the only available figures of 2002 were used. For 2008, the data are the one of 2007 (the annual reports of 2008 has not yet be published).

16 Table T16 – Education and research

16.1 FRA 2010 Categories and definitions

Term	Definition
Annual graduation of students	Number of students that have successfully completed a Bachelor's or higher degree in forest science or achieved a certificate or diploma as forest technician.
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 implementing research programmes on forest matters. Funding is 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
Ministry of Higher Education database and statistics	H	Graduation of students Bachelor's degree (BSc) or equivalent, Technician certificate or diploma	2000, 2005	
Abdegadir A. Y., 2009. Current Status of Forestry Education in Sudan Paper presented to a workshop on Al Zaiem Azhari University – 9 Feb, 2009	M	Graduation of students Bachelor's degree (BSc) or equivalent	2008	
Index of teachers and researchers: as reported in the Auspices of scientific innovation database	H	Professionals working in publicly funded forest research centres Doctor's degree (PhD), Master's degree (MSc) or equivalent and Bachelor's degree (BSc) or equivalent	2005	

16.2.2 Original data

- Number of Professional working ability forest-related education 2000

University or Research Centre	**B.Sc.**		**M.Sc.**		**Ph.D.**	
Gender	**M**	**F**	**M**	**F**	**M**	**F**
University of Khartoum	2	3	3	1	1	14
Sudan University for Science and Technology	2	0	12	1	11	1
Upper Nile University	11	1	6	2	2	0
University of Zalengi	8		11	3	8	1
University of Juba	12	1	18	10	30	0
University of Bakht Arruda	0	0	13	13	2	0
University of Kordofan	18	3	10	3	17	1
University of Sennar	3	3	9	3	3	1
University of Fashir	7	1	12	2	2	0
University of West Kordofan	25	1	18	1	7	0
National Centre for Research	1	2	2	3	0	0
Agriculture and Technology Research Corporation in	0	0	0	0	0	0
Total	**89**	**11**	**114**	**42**	**83**	**18**

Source: Teachers and Researchers, the auspices of scientific innovation database

- Graduated students from forestry higher education institutes 2000

Degree	**B.Sc.**		**M.Sc.**		**Ph.D.**		**Diploma**	
Gender	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
University								
Khartoum	14	16	7	1	3	0	0	0
Sudan	23	20	2	0	1	0	0	0
Upper Nile	0	0	0	0	0	0	0	0
Zalengi	0	0	0	0	0	0	0	0
Juba	58	52	5	3	0	0	0	0
Bakht Arruda	0	0	0	0	0	0	0	0
Kordofan	0	0	0	0	0	0	0	0
Sennar	42	36	0	0	0	0	0	0
Fashir	4	4	0	0	0	0	0	0
Total	**141**	**128**	**14**	**4**	**4**	**0**	**5**	**3**

Source: Ministry of Higher Education database and statistics

- Number of Professional working ability forest-related education 2005, 2008

	2005						**2008**					
University or Research Centre	**B.Sc.**		**M.Sc.**		**Ph.D.**		**B.Sc.**		**M.Sc.**		**Ph.D.**	
	M	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
University of Khartoum	7	0	3	1		1	3	4	4	1	18	1
Sudan University for Science and Technology	3	2		0	1	0	0	0	10	2	14	0
Upper Nile University	7	2	20	6	4	1	0	0	0	0	0	0
University of Zalengi	0	0	3	0	1	0	0	0	3	0	1	0
University of Juba	9	11	29	15	37	2	14	11		15	30	7
University of Bakht Arruda	0	0	13	13	2	0	0	0	13	13	2	0
University of Kordofan	20	4	44	7	7	0	20	4	44	7	7	0

University of Sennar	0	0	12	6	3	2	0	0	12	6	3	2
University of Fashir	3	0	11	3	4	0	3	0	11	3	4	0
National Centre for Research	2	1	3	1	3	3	4	2	3	1	3	3
Agriculture and Technology Research Corporation in	5	3	16	2	15	2	5	3	16	2	15	2
Total	**56**	**23**	**166**	**54**	**102**	**11**	**49**	**24**	**143**	**50**	**97**	**15**

Source: Teachers and Researchers, the auspices of scientific innovation database

- Graduated students from forestry higher education institutes 2005

Degree	**B.Sc.**		**M.Sc.**		**Ph.D.**		**Diploma**	
Gender	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
University								
Khartoum	26	25	6	2	2	1	0	0
Sudan	40	19	6	0	1	0	0	0
Upper Nile	19	7	0	0	0	0	0	0
Zalengi	3	7	0	0	0	0	0	0
Juba	41	41	3	6	1	1	0	0
Bakht Arruda	113	78	0	0	0	0	0	0
Kordofan	52	77	8	1	1	0	0	0
Sennar	17	16	0	0	0	0	0	0
Fashir	73	89	0	0	0	0	0	0
Total	**384**	**359**	**23**	**9**	**5**	**2**	**0**	**0**

Source: Ministry of Higher Education database and statistics

- Graduated students from forestry higher education institutes 2008

Degree	**B.Sc.**		**M.Sc.**		**Ph.D.**		**Diploma**	
Gender	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
University								
Khartoum	20	42	0	0	0	0	0	0
Sudan	36	23	1	0	2	0	0	0
Upper Nile	22	4	0	0	0	0	0	0
Zalengi	3	7	0	0	0	0	0	0
Juba	49	35	3	6	1	1	0	0
Bakht Arruda	113	78	0	0	0	0	0	0
Kordofan	52	77	8	1	1	0	0	0
Sennar	17	16	0	0	0	0	0	0
Fashir	41	59	0	0	0	0	0	0
Total	**353**	**341**	**12**	**7**	**4**	**1**	**0**	**0**

Source: Ministry of Higher Education database and statistics

- Forestry Higher Education Institutes 2008-2009

University	Certificate	Planned Intake
Khartoum	B.Sc	80
Sudan	B.Sc	40
Upper Nile	B.Sc	21
Zalengi	B.Sc	48
Juba	B.Sc	26
Bakht Arruda	B.Sc	(169)
Kordofan	B.Sc	(186)
Sennar	B.Sc	(70)
Fashir	B.Sc	(70)
West Kordofan	B.Sc	(149)

Source: Abdegadir A. Y., 2009. Current Status of Forestry Education in Sudan Paper presented to a workshop on Al Zaiem Azhari University – 9 Feb, 2009

16.3 Analysis and processing of national data

16.3.1 Estimation and forecasting

- Number of Professional working ability forest-related education

Degree	B.Sc.		M.Sc.		Ph.D.	
Gender	M	F	M	F	M	F
Year						
2000	89	11	114	42	83	18
2005	56	23	166	54	102	11
2008	49	24	143	50	97	15

- Graduated students from forestry higher education institutes

Degree	B.Sc.		M.Sc.		Ph.D.		Diploma	
Gender	M	F	M	F	M	F	M	F
Year								
2000	141	128	14	4	4	0	0	0
2005	384	359	23	9	5	2	0	0
2008	353	341	12	7	4	1	0	0

16.4 Data for Table T16

FRA 2010 Category	Annual graduation of students within the country					
	2000		2005		2008	
	Number	%Female	Number	%Female	Number	%Female
Master's degree in Forest Science	18	5.6	32	28.1	19	36.8
Bachelor's degree in Forest Science	269	47.6	743	48.3	694	49.1
Forest technician certificate / diploma	n/a	n/a	n/a	n/a	n/a	n/a
FRA 2010 Category	**Professionals working in public forest research centres**					
	2000		**2005**		**2008**	
	Number	**%Female**	**Number**	**%Female**	**Number**	**%Female**
Doctor's degree (PhD)	101	17.8	113	9.7	112	13.4
Master's degree (MSc) or equivalent	156	26.9	220	24.5	193	25.9
Bachelor's degree (BSc) or equivalent	100	11	79	29.1	73	32.9

16.5 Comments to Table T16

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Annual graduation of students within the country	New universities and forestry educational institutes were established in Sudan in the last decade ; for this reason some universities has no graduates but students. Not all records of 2008 are available for this report. In some cases, fifth year students (2007) were considered as graduation data for 2008.	The trend could be seen from the B.Sc. graduates.
Professionals working in public forest research centres	The available data also does not include all new employers of 2008.	

Other general comments to the table
Forestry higher education institutes are available in ten universities. Four of them offer B.Sc. Programs (5 years) in Faculties of Forestry or Forestry and Range Management, while six universities offer the B.Sc. programs (5 years) in Departments of Forestry in Faculties of Natural Resources. Decreasing enrolment affect also the number of graduates.

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
Finance Sector (FNC). Finance Revision Reports 2000 and 2005. Date 2009.	H	Total Revenue. Total operational expenditure	2000 And 2005	

17.2.2 Classification and definitions

National class	Definition
Revenue	The total earning of FNC, which will be used to implement its activities. Revenue is mostly domestic.
Expenditure	The cost to cover the operations and the obligations of the FNC.

17.2.3 Original data

Revenue 2000 = 24 203 483 Sudanese Dinars (SD)
Revenue 2005 = 2 190 038 798 Sudanese Dinars (SD)

Expenditure 2000 = 98 161 575 SD
Expenditure 2005 = 2 265 003 875 SD

17.3 Data for Table T17

Table 17a - Forest revenues

FRA 2010 Categories	Revenues (1000 local currency)	
	2000	2005
Forest revenue	24 203	2 190 039

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	98 162	2 265 004	0	0	98 162	2 265 004
Transfer payments	0	0	0	0	0	0
Total public expenditure	**98 162**	**2 265 004**	**0**	**0**	**98 162**	**2 265 004**

If transfer payments are made for forest management and conservation, indicate for what specific objective(s) - Please tick all that apply.		
		Reforestation
		Afforestation
		Forest inventory and/or planning
		Conservation of forest biodiversity
		Protection of soil and water
		Forest stand improvement
		Establishment or maintenance of protected areas
		Other, specify below

17.4 Comments to Table T17

Variable / category	Comments related to data, definitions, etc.	Comments on the reported trend
Forest revenue	Obtained directly from the activities of the FNC. All revenues are domestic.	Increasing

Operational expenditure	All expenditures are operational. They are covered by the domestic funding.	Increasing
Transfer payments	No significant operational.	

Other general comments to the table

Annex 1. Results from Africover

Areas classified as forests:

2SCJ	20019-12374	Closed shrubs	Continuous Closed Medium To High Shrubland (Thicket)	Forest	33881
2SCJZ	20020-12374	Closed shrubs - fragmented	Fragmented Closed Medium To High Shrubland (Thicket)	Forest	2331
2SOJ67	20391-709	Open shrubs with closed to open herbaceous and sparse trees	((70-60) - 40%) Medium To High Shrubland With Short Herbaceous And Emergents	Forest	221827
2SPJ6	20389-12757	Open general shrubs with herbaceous	Medium To High Shrubland With Short Herbaceous	Forest	26456538
2SVJ67	20391-3719	Very open shrubs with closed to open herbaceous and sparse trees	(40 - (20-10)%) Medium To High Shrubland With Medium to Tall Herbaceous And Emergents	Forest	7148700
2TC128	20638-15048	Closed trees (semi-evergreen) with closed to open shrubs	Semi-Evergreen Forest With Shrubs	Forest	18168
2TC28	20646	Closed trees with closed to open shrubs	Broadleaved Deciduous Forest With Shrubs	Forest	422822
2TC328	20654-15045	Closed (needleleaved evergreen) trees with closed to open shrubs	Mixed Forest With Shrubs	Forest	
2TC8	20286	Closed trees with closed to open shrubs	Trees with Shrubs	Forest	200
2TCI177	20637-52949	Closed multilayered trees (broadleaved evergreen)	Multi-Layered Broadleaved Evergreen High Forest (With Second Layer Of Medium High	Forest	100681

			Trees) With Emergents		
2TCI217	20643-13202(1)[Z10]	Closed multilayered trees (semi-deciduous)	Multi-Layered Semi-Deciduous High Forest (With Second Layer Of High Trees)	Forest	
2TCL1-pc	20634-13314-Zt4	Closed low trees - Masquit (broadleaved evergreen)	Broadleaved Evergreen Low Forest, Single Layer Floristic Aspect: Masquit (Prosopis chilensis)	Forest	31057
2TCM28	9999-1	User Code 2TCM28 - Tree closed. Not in the legend	Tree closed. Not in the legend	Forest	
2TO268	20868-3011	Open trees (broadleaved deciduous) with open herbaceous and sparse shrubs	Broadleaved Deciduous ((70-60) - 40%) Woodland With Open Herbaceous Layer And Sparse Shrubs	Forest	2138448
2TO28	20862-1	Open trees with closed to open shrubs	Broadleaved Deciduous ((70-60) - 40%) Woodland With Shrubs	Forest	1510393
2TOM26	20865-1186	Open medium trees (broadleaved deciduous) with closed to open herbaceous	Broadleaved Deciduous ((70-60) - 40%) Woodland With Herbaceous Layer	Forest	115275
2TP268	20868-15058	Open general trees with open herbaceous and sparse shrubs	Broadleaved Deciduous Woodland With Open Herbaceous Layer And Sparse Shrubs	Forest	8836492
2TP28	20862	Open general trees with closed to open shrubs	Broadleaved Deciduous ((70-60) - (20-10)%) Woodland With Shrubs	Forest	3690130
2TP68	20332	Open general trees with closed to open herbaceous & sparse shrubs	Woodland With Herbaceous Layer And Sparse Shrubs	Forest	11781

2TP8	20326	Open general trees with closed to open shrubs	Woodland With Shrubs	Forest	10754
2TPM28	20862-13297	Open general trees (broadleaved deciduous) with open shrubs	Broadleaved Deciduous Woodland With Open Shrubs	Forest	9601
2TPM86	21928-13312	Open general medium trees with closed to open shrubs and closed to open herbaceous	Open Medium High Trees with High Shrubs and Herbaceous	Forest	
2TR28	21398	Sparse trees and sparse shrubs (wadi)	Broadleaved Deciduous Sparse Trees And Sparse Shrubs	Forest	1723048
2TR6	20505	Sparse trees with sparse herbaceous	Sparse Trees And Sparse Herbaceous	Forest	
2TRL2	20234-13314	Sparse low trees (broadleaved deciduous)	Broadleaved Deciduous Sparse Low Trees	Forest	239152
2TV268	20868-3012	Very open trees (broadleaved deciduous) with closed to open herbaceous and sparse shrubs	Broadleaved Deciduous (40 - (20-10)%) Woodland With Herbaceous Layer And Sparse Shrubs	Forest	3482467
2TV28	20862-3012	Very open trees (broadleaved deciduous) with closed to open shrubs	Broadleaved Deciduous (40 - (20-10)%) Woodland With Shrubs	Forest	2676783
2TVL1-pc	20849-4277-Zt4	Very open low trees - Masquit (broadleaved evergreen)	Broadleaved Evergreen (40 - (20-10)%) Woodland, Single Layer Floristic Aspect: Masquit (Prosopis chilensis)	Forest	69171
2TVM26	20865-4196	Very open medium trees (broadleaved deciduous) with closed to open herbaceous	Broadleaved Deciduous (40 - (20-10)%) Woodland With Herbaceous Layer	Forest	121253

2WC	20003	Closed woody vegetation	Continuous Closed Woody Vegetation	Forest	
2WC7	20268	Closed woody with sparse trees	Closed Woody Vegetation With Emergents	Forest	44106
2WCZ	20004	Closed woody - fragmented	Fragmented Closed Woody Vegetation	Forest	30423
2WP26	20745	Open general woody (broadleaved deciduous - mixed) with closed to open herbaceous	Broadleaved Deciduous Open Woody Vegetation With Herbaceous Layer	Forest	42361
2WP6	20304	Open general woody with closed to open herbaceous	Open Woody Vegetation With Medium to Tall Herbaceous Layer	Forest	5962532
2WP67	20306-121335	Open general woody with closed to open herbaceous and sparse trees	Open Woody Vegetation With Medium to Tall Herbaceous Layer With Emergents	Forest	31538
2WP6Z	20309	Open general woody - fragmented with closed to open herbaceous	Open Woody Fragmented Vegetation With Herbaceous Layer	Forest	2120266
4SCJFF1Y	40176-39611-R2	Closed shrubs (broadleaved evergreen) on permanently flooded land - brackish water	Broadleaved Evergreen Closed Medium To High Shrubs On Permanently Flooded Land Water Quality: Brackish	Forest	1047
4TCFF1Y	40113-R2	Closed trees (broadleaved evergreen) on permanently flooded land - brackish water	Broadleaved Evergreen Forest On Permanently Flooded Land Water Quality: Brackish	Forest	4434
4TCIFF18	40501-33991-R1	Closed trees with closed to open shrubs on permanently flooded land - fresh water	Broadleaved Evergreen High Forest With High Shrubs On Permanently Flooded Land Water Quality: Fresh	Forest	

4TOF6	40344-1	Open trees with closed to open herbaceous on temporarily flooded land	Woodland With Herbaceous Vegetation On Temporarily Flooded Land	Forest	41528
4TOF8	40346-1	Open trees with sparse shrubs on temporarily flooded land	Woodland With Sparse Shrubs On Temporarily Flooded Land	Forest	38111
4TPF6	40344-4999-R1	Open general trees with closed herbaceous on temporarily flooded land - fresh water	Woodland With Closed Herbaceous Vegetation On Temporarily Flooded Land Water Quality: Fresh	Forest	
4TVF6	40344-287	Very open trees with closed to open herbaceous vegetation on temporarily flooded land	Woodland With Herbaceous Vegetation On Temporarily Flooded Land	Forest	130352
4TVF8	40343-572-R1	Very open trees with closed to open shrubs on temporarily flooded land - fresh water	Woodland With Open Shrubs On Temporarily Flooded Land Water Quality: Fresh	Forest	346740
4WPF6	40332-R1	Open general woody with closed to open herbaceous on temporarily flooded land - fresh water	Open Woody Vegetation With Herbaceous Vegetation On Temporarily Flooded Land Water Quality: Fresh	Forest	1473978
HR13T4-as	10786-12602-S14Zs6	Clustered Herbaceous Small Fields (1 add. Crop: Acacia senegal) - Rainfed	Scattered Clustered Small Sized Field(s) Of Rainfed Herbaceous Crop(s) (One Additional Crop) (Tree Crop With Simultaneous Period) . Second Crop: Other Non-Food Crops - Acacia senegal	Forest	227477

HR3T4-as	10766-12602-S14Zs6	Continuous Herbaceous Small Fields (1 add. Crop: Acacia senegal) - Rainfed	Small Sized Field(s) Of Rainfed Herbaceous Crop(s) (One Additional Crop) (Tree Crop With Simultaneous Period) . Second Crop: Other Non-Food Crops - Acacia senegal	Forest	397990
TBD47PL-an	10153-1891-S1099Zs5W7	Forest Plantation - Acacia nilotica	Permanently Cropped Area With Rainfed Broadleaved Deciduous Tree Crop(s) Dominant Crop: Wood and Timber - Other wood/timber - Acacia nilotica Crop Cover: Plantation(s)	Forest	250181
TBD47PL-as	10153-1891-S1099Zs6W7	Forest Plantation - Acacia Senegal	Permanently Cropped Area With Rainfed Broadleaved Deciduous Tree Crop(s) Dominant Crop: Wood and Timber - Other wood/timber - Acacia senegal Crop Cover: Plantation(s)	Forest	6971
TBE47PL-e	10153-1-S1002W7	Forest Plantation - Eucalyptus spp.	Permanently Cropped Area With Rainfed Broadleaved Evergreen Tree Crop(s) Dominant Crop: Wood and Timber - Eucalypt (Eucalyptus spp.) Crop Cover: Plantation(s)	Forest	524
TBE57PL-e	10157-1-S1002W7	Irrigated Forest Plantation - Eucalyptus	Permanently Cropped Area With Irrigated Broadleaved Evergreen Tree Crop(s) Dominant Crop: Wood and Timber - Eucalypt (Eucalyptus spp.) Crop Cover: Plantation(s)	Forest	1012

TNE47PL	10494-5671-W7	Forest Plantation	Permanently Cropped Area With Rainfed Needleleaved Evergreen Tree Crop(s) Crop Cover: (Plantation(s))	Forest	867
TR13H57V	10555-12627-W8	Irrigated Tree Crops, (1 add. Herbaceous Crop) - Clustered Small Field	Permanently Cropped Area With Scattered Clustered Small Sized Field(s) Of Surface Irrigated Tree Crop(s) (One Additional Crop) (Herbaceous Terrestrial Crop With Simultaneous Period) . Crop Cover: Orchard(s)	Forest	41606
TR3H57V	10547-12627-W8	Irrigated Tree Crop (1 add. Herbaceous Crop) - Small Fields	Permanently Cropped Area With Small Sized Field(s) Of Surface Irrigated Tree Crop(s) (One Additional Crop) (Herbaceous Terrestrial Crop With Simultaneous Period) . Crop Cover: Orchard(s)	Forest	167138

Annex 2. Presentation of the main biotic agents affecting the Sudanese forest

Category/biotic agent	Habitat/Sub-category/Genus/Species	Species	Extent of damage
1) Man			Irrational behaviour and misuse.
2) Vertebrates	▪ Domestic mammals	Goats and camels	-Browse branches, twigs, leaves, leaflets, buds, flowers, fruits and seeds. Goats browse on sprout and seedlings beside soil compaction, which impairs soil permeability and consequently its suitability for soil germination.
	▪ Wild mammals	Elephants, giraffes, antelopes, rabbits, baboons, monkeys, warthogs.	-Browse tree parts, but elephants sometimes uproot or break trees or shrubs. -Rabbits, baboons and monkeys devour sprouts and seedlings. -warthogs damage young trees when they excavate for roots and grubs.
3) Birds	*Quelia quelia aethiopica* (Zarzour, Gaddoum Ahmar)		Roost or nest in huge numbers on young A. nilotica plantations, causing stems or branches to break under their weights. Render trees unsuitable for timber production.
4) Invertebrates	▪ Coleoptera beetles	-Bruchid seed borer	Damage Acacia seeds especially Sunt *Acacia nilotica* and Hashab *A. Senegal.*Impede afforestation/Reforestation operations.
	▪ Dieback beetles	Buperetidae *Sphenoptera chalcicroa arenosa*	Dieback of Sunt in the Nilotic forests from Khartoum to Roseires, Dinbder, rahad and Abu Habil. Lead to mortality of complete forests
	▪ Talh borer	*Sionxylon senegalense*	Infests talh wood immediately after felling, renders it useless even for fire-wood or charcoal let alone for building poles. Infests most sapwood of species and bamboo.
	▪ Longhorn beetle	Cerambicydae	Harms sawn hard wood especially Homeid *Sclerocarya birrea*.
	▪ Isoptera termites	**Genus:** Microtermes **Genera:** -Microtermes -Odontotermes -Psamotermes	Harms trees at any stage from seedling to mature tree. Destroy wood of most tree species. Found in areas with rainfall more than 400 mm. Subterranean with no obvious mound. Spread all over Sudan.
	▪ Orthoptera-locust and cricket	-Night wanderer (Sari el Lail) *Anacerdium melanorhodon melanorhodon*	-Damages Gum Arabic production. Devour newly germinating seeds and young seedlings to an extent that can hinder

		-Crickets and Mole crickets	afforestation/reforestation in the planting season.
5) Plants	▪ Indigenous	**-Grasses and herbs:** -Wild Sorghum (Adar) = *S. sudanense, S. lanceolatum* -Ankoj, Nagil, Siaada,Rubaa, Soreib *Phyllanthus spp.*	Compete newly germinating seeds and seedlings. Removed through weeding.
		-Creepers: Cucurbits, watermelon, pumpkin, leef (*Lufa aegyptiaca*), and others.	Compete newly germinating seeds and seedlings. Spirally wind round shrubs and trees and lean on them in search of sunlight. Weaken trees, spoil their form and break them.
		-Epiphytes: *Loranthus acaciae*	Grows on branch axils of thalh, Sunt, Heglig, habil and others. Depends on host for supply of water and nutrients. Synthesize its own food but leaves on the host for exposure to sunlight, which might weaken the host or completely smother it.
		-Invasive alien species: Mesquite *Prosopis chilensis*	Threatens agricultural schemes, causes Genetic Pollution and displace indigenous plants.
6) Micro-organisms		Bacteria, fungi,	Causes: -Wood rot - Sap staining -Weaken and discolor wood -Render the wood unsuitable for some uses, therefore chemical treatment is necessary.