



**Food and Agriculture Organization of the United Nations,
Forestry Department**

and



International Network for Bamboo and Rattan (INBAR)

**GLOBAL FOREST RESOURCES
ASSESSMENT UPDATE 2005**

<ETHIOPIA>

**COUNTRY REPORT
ON
BAMBOO RESOURCES
(FINAL DRAFT)**

PLACE, ADDIS ABABA, ETHIOPIA

DATE: MAY, 2005

Table of contents

1 Table T1 – Extent of Bamboo Forest		5
1.1 GBRA 2005 Categories and definitions	.....	5
1.2 National Data on Bamboo Resources	.....	5
1.3 Data for National Reporting Table T1	.....	5
1.4 Comments to National Reporting Table T1	.....	5
2 Table T2 – Ownership of Bamboo Forest		6
2.1 GBRA 2005 Categories and definitions	.....	6
2.2 National Data on Bamboo Resources	.....	6
2.3 Data for National Reporting Table T2	.....	6
2.4 Comments to National Reporting Table T2	.....	6
3 Table T3 – Characteristics of Bamboo Forest		7
3.1 GBRA 2005 Categories and definitions	.....	7
3.2 National data on Bamboo in Forests and Other Wooded lands	.....	7
3.3 Data for National Reporting Table T3	.....	7
3.4 Comments to National Reporting Table T3	.....	8
4 Table T4 – Bamboo Growing Stock		8
4.1 GBRA 2005 Categories and definitions	.....	8
4.2 National data on Bamboo Resources	.....	8
4.3 Data for National Reporting Table T4	.....	9
4.4 Comments to National Reporting Table T4	.....	9
5 Table T5 – Bamboo Biomass stock		9
5.1 GBRA 2005 Categories and definitions	.....	9
5.2 National Data on Bamboo Resources	.....	10
5.3 Data for National Reporting Table T5	.....	10
5.4 Comments to National Reporting Table T5	.....	10
6 Table 6 – Diversity of bamboo tree species		11
6.1 GBRA 2005 Categories and definitions	.....	11
6.2 National Data on Bamboo Resources	.....	11
6.3 Data for National Reporting Table T6	.....	11
6.4 Comments to National Reporting Table T6	.....	12
7 Table T7 – Bamboo Removal		12
7.1 GBRA 2005 Categories and Definitions	.....	12
7.2 National Data on Bamboo Resources	.....	12
7.3 Data for National Reporting Table T7	.....	13
7.4 Comments to National Reporting Table T7	.....	13
8 Table 8 – Value of Wood Removal		13
8.1 GBRA 2005 Categories and Definitions	.....	13
8.2 National Data	.....	14
8.3 Data for National Reporting Table T8	.....	14
8.4 Comments to National Reporting Table T8	.....	14
9 Table 9 – Non Wood Bamboo Product Removal		14

9.1 GBRA2005 Categories and Definitions	14
9.2 National Data on Bamboo Resources	15
9.3 Data for National Reporting Table T9	15
9.4 Comments to National Reporting Table T9	15
10 Table T10– Value of Non Wood Bamboo Product	15
10.1 GBRA 2005 Categories and Definitions.....	15
10.2 National Data on Bamboo Resources	15
10.3 Data for National Reporting Table T10	16
10.4 Comments to National Reporting Table T10	16
11 Map of country’s bamboo resources distribution	16
12 List of bamboo species in the country	16

General Guidelines:

The main purpose of the Country Thematic Report on Bamboo Resources (CTRB) is to develop a Global Bamboo Resources Assessment (GBRA) and to integrate it in the global UN FAO FRA. The approach is to create sub-category on Bamboo in the framework of FRA 2005 (www.fao.org/forestry/fra) to provide supplementary information on bamboo resources. This document provides format for compiling information on Bamboo resources and should be treated as a supplement to the basic documents of FRA 2005 including Specification of National Reporting tables, FRA Working Paper No. 81; Guidelines for Country Reporting, FRA Working Paper No. 82 and Terms and Definitions, FRA Working Paper No. 83.

The country Bamboo Resources Thematic Study Report should clearly and concisely document all data sources that have been selected and used for this reporting process and assign quality rating to the data sources. Comment on any problems encountered in finding relevant data sources. The Report should also indicate if no data sources have been found which meet the requirements. Similarly all the relevant national classification and definitions should be documented clearly and concisely. Comments on any problems or incompatibilities in classification and definitions should also be provided, if necessary. Please email the Bamboo Thematic Report directly to the focal point at INBAR (mlobovikov@inbar.int) with the copy to FAO (kailash.govil@fao.org) as a part of GFRA.

General information

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Date of submission of 1st draft:	March 1, 2005
Date of submission of 2nd draft	April 1, 2005
Date of submission of final report	May 1, 2005

1 Table T1 – Extent of Bamboo Forest

1.1 GBRA 2005 Categories and definitions

Category	Definition
Bamboo on forest land	Bamboo on lands defined as "Forest" in FRA 2005.

1.2 National Data on Bamboo Resources

1.2.1 Data sources

References	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Sympodial & Monopodial bambo	M	highland & lowland	1997	

1.2.2 Classification and definitions

National class	Definition
Bamboo on forest land	Bamboo on forest and formers lands (Planted)

1.2.3 Original data

1.3 Data for National Reporting Table T1

GBRA 2005 Categories	Area (1000 hectares)		
	1990	1997	2000-2005
Bamboo on forest land			
Monopodial bamboo area	no-data	129,626	Not updated
Sympodial bamboo area	“ “	700,000	“ “
TOTAL	“ “	829,626	“ “

1.4 Comments to National Reporting Table T1

Including information on the minimum area on which information is collected

- The estimated total area of sympodial bamboo is 700,000ha, out of this only 481,000 ha is mapped and partially surveyed by LUSO consult GmbH in 1997.
- Similarly the total area of mapped naturally grown Monopodial bamboo is 129,626ha and 19,000 ha was planted by farmers, which makes the sum to 148,626ha.
- Changes in area might have occurred up to now since the satellite photographs and verifications on the ground have been taken in 1996/97.
- Reference: Luso Consult GmbH (1997) ③ study on sustainable Bamboo Management. ④ GTZ, Humburg

2 Table T2 – Ownership of Bamboo Forest

2.1 GBRA 2005 Categories and definitions

Category	Definition
Private ownership	Same as FRA: Land owned by individuals, families, private co-operatives, corporations, industries, religious and educational institutions, pension or investment funds, and other private institutions.
Public ownership	Same as FRA: Land owned by the State (national, state and regional governments) or government-owned institutions or corporations or other public bodies including cities, municipalities, villages and communes.
Other ownership	Same as FRA: Land that is not classified either as “Public ownership” or as “Private ownership”.

2.2 National Data on Bamboo Resources

2.2.1 Data sources

References	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Private and Public Ownership	M/L	Sympodial Monopodial	1997	

2.2.2 Classification and definitions

National class (Bamboo)	Definition
Private and Public	Bamboo forest owned by rural households or protected by the state

2.2.3 Original data

2.3 Data for National Reporting Table T2

GBRA 2005 Categories	Area (1000 ha)	
	1990	1997
Private ownership	No-Data	19,000
Public ownership	“ “	829,600
Other ownership	“ “	none
Total	“ “	848,600

2.4 Comments to National Reporting Table T2

- Private Ownership refers to farmer’s bamboo plots found on lower altitudes up to 1800 m.a.s.l. The natural bamboo stands usually occur above 2200 m.a.s.l. Source WBISPP (2004), ③ Forest Resources of Ethiopia ③ MoA , Addis Ababa.
- All public bamboo stands belong to Regional Governments.

3 Table T3 – Characteristics of Bamboo Forest

3.1 GBRA 2005 Categories and definitions

Category	Definition
Natural bamboo forest	Bamboo area of naturally regenerated native bamboo species.
Plantation	Bamboo area of native or introduced species, established through planting, seeding or assisted natural regeneration.

3.2 National data on Bamboo in Forest

3.2.1 Data sources

References	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Natural bamboo forest & plantation	/M	Sympodial & monopodial	1997	

3.2.2 Classification and definitions

National class	Definition
Natural & Plantation	Naturally occur and planted by farmers.

3.2.3 Original data: - Private plantations of the highland type bamboo is common in Guraghe and Sidama zones of SNNP Region and in Awi zone of Amhara Region (see also the attached distribution map)

3.3 Data for National Reporting Table T3

GBRA 2005 Categories	Area (1000 hectares)		
	1990	1997	2000-2005
Natural bamboo forest	No-data	829,626	Not updated
Plantation	“ “	19,000	“ “
TOTAL	“ “	848,626	“ “

3.4 Comments to National Reporting Table T3

No.	Sympodial Bamboo/Lowland B.	Monopodial Bamboo/Highland B.
1.	Mean Altitude Nat. Forest: 1000-1800m	2200 – 3200m
2.	Minimum Annual rainfall: > 700mm/yr	1500 mm/yr
3.	Mean annual rainfall : 900-1400mm/yr	1700 – 2200mm/yr
4.	Grows on poor soils	Need moderately fertile soils
5.	No planted stands	Farmers' homestead plantations
6.	Flowering: scattered every year; seeds: easy to collect, and most are viable.	Flowering: scattered every year; (more abundant every 7 yrs) seed:- most empty, majority are not viable
7.	Total Area in Ethiopia: 700,000ha	Total Area in Ethiopia: 148,000ha
a.	Mapped: 481,000ha.	a) mapped; 129,626ha
b.	not mapped: 219,000 ha	b) not mapped: 19,000ha
c.	the major portion of the area is not properly managed	c) 130,000ha are in good condition

Source: Study on Sustainable Bamboo Management, 1997, Final Report, Luso consult. Hamburg, Germany.

4 Table T4 – Bamboo Growing Stock

4.1 GBRA 2005 Categories and definitions

Category	Definition
Bamboo Growing stock	Weight (tons) of all bamboo forest more than X cm in diameter at breast height.
Commercial growing stock of Bamboo	The part of the growing stock of bamboo species that are considered as commercial or potentially commercial under current market conditions, and with a diameter at breast height of Z cm or more.
Growing stock of Common bamboo species	Weight (tons) of the most common bamboo species.

4.2 National data on Bamboo Resources

4.2.1 Data sources

References	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Sympodial & Monopodial bamboo	M	highland & lowland	1997	

4.2.2 Classification and definitions

Category	Definition
Bamboo on forest land	Bamboo on forest and farmer land (Planted)

4.2.3 Original data

4.3 Data for National Reporting Table T4

GBRA 2005 Categories	Total weight (tons)		
	1990	1997	2000-2005
Bamboo Growing stock	No-data	3 million	not-updated
Commercial growing stock	“ “	51 – 70/ha	“ “
Annual growing stock	“ “	8 – 10/ha	“ “

Note: if possible, please (1) breakdown by species groups (2) include information on the minimum diameter used as thresholds and (3) provide coefficient of number of culms per a ton of weight

Source: LUSO Consult, (1997).

4.4 Comments to National Reporting Table T4

- The average annual stem increment of the unmanaged natural bamboo forests of Ethiopia is 8 - 10 tones of oven dry matter per ha.
- Assuming selective felling of culms 3 or more years of age, it is thus possible to harvest about 3 million tonnes/yr. of oven dry biomass on a sustainable basis from the estimated 848,626 hectare of bamboo in Ethiopia
- Arundinaria alpina (Monopodial bamboo)
 - o 51 tons /ha/
 - o 114 culms /ton.
 - o No minimum diameter
- Oxytenanthera abyssinica (sympodial bamboo).
 - o 19 tons /ha
 - o 413 culms /ton.
 - o No minimum diameter.

5 Table T5 – Bamboo Biomass stock

5.1 GBRA 2005 Categories and definitions

Category	Definition
Above-ground biomass of Bamboo	All living biomass above the soil including stem, stump, branches, bark, seeds, and foliage.
Below-ground biomass of Bamboo	All living biomass of live roots. Fine roots of less than 2mm diameter are excluded because these often cannot be distinguished empirically from soil organic matter or litter.

5.2 National Data on Bamboo Resources

5.2.1 Data sources

References	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Sympodial & Monopodial bamboo	M	highland & lowland	1997	

5.2.2 Classification and definitions

Category	Definition
Bamboo on forest land	Bamboo on forest and farmers land (Planted)

5.2.3 Original data

5.3 Data for National Reporting Table T5

GBRA 2005 Categories	Bamboo Biomass (million metric ton dry weight)		
	1997	2000	2005
Above-ground biomass of Bamboo	24	No data	No data
Below-ground biomass of Bamboo	Na	“ “	“ “
Total of living biomass	Na	“ “	“ “
TOTAL			

5.4. Comments to National Reporting Table T5

- The total living biomass is calculated:
 - o for monopodial bamboo: 150,000 ha x 51,000kg/ha = 7,650,000 metric ton dry weight.
 - o for sympodial bamboo 850,000 ha x 19600 kg/ha = 16,660,000 metric ton dry weight. Which makes the grand total = 7,650,000 + 16,660,000 = 24,310,000 metric ton dry weight.
- The oven-dry biomass of the living and dead culms available on the site equals to 67% and 33% (51 and 17 ton/ha) respectively for monopodial bamboo and 50% (20 and 10) tons/ha for sympodial bamboo. The proportion of dead culms shows low levels of utilisation and higher mortality.

Source; Lusoconsult (1997)

6 Table 6 – Diversity of bamboo tree species

6.1 GBRA 2005 Categories and definitions

Category	Definition
Number of native Bamboo species	The total number of native tree species that have been identified within the country.
Number of introduced Bamboo species	The total number of introduced tree species that have been identified within the country.
Number of critically endangered Bamboo species	The number of native tree species that are classified as “Critically endangered” in the IUCN red list.
Number of endangered Bamboo species	The number of native tree species that are classified as “Endangered” in the IUCN red list.
Number of vulnerable Bamboo species	The number of native tree species that are classified as “Vulnerable” in the IUCN red list.

6.2 National Data on Bamboo Resources

6.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Sympodial & Monopodial bambbo	M	highland & lowland	1997	

6.2.2 Classification and definitions

Category	Definition
Bamboo on forest land	Bamboo on forest and farmers land (Planted)

6.3 Data for National Reporting Table T6

GBRA 2005 Categories	Number of species (Year 2000)
Native Bamboo species	2
Introduced Bamboo species	0
Critically endangered Bamboo species	0
Endangered Bamboo species	0
Vulnerable Bamboo species	2

6.4 Comments to National Reporting Table T6

- Introduction of bamboo species is not yet started. Even the existing species physiological and morphological characteristics are not fully studied. Their ecological requirements also need further investigation.
- Appropriate techniques and methods of propagation by seed and vegetative means must be identified through well defined bamboo research in-order to obtain the required knowledge and technology of the potential exotic species before start of planting on commercial basis.

7. Table T7 – Bamboo Removal

7.1 GBRA 2005 Categories and Definitions

Category	Definition
Bamboo Wood removal	The Bamboo wood removed (volume) for production of goods and services other than energy production (woodfuel).
Woodfuel Bamboo removal	The Bamboo wood removed for energy production purposes, regardless whether for industrial, commercial or domestic use.

7.2 National Data on Bamboo Resources

7.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Sympodial & Monopodial bambbo	M	highland & lowland	1997	

7.2.2 Classification and definitions

National class	Definition

7.2.3 Original data

7.3 Data for National Reporting Table T7

GBRA2005	Bamboo removal (million ton)		
	1990	2000	2005
Bamboo wood removal	no data	no data	no data
Bamboo woodfuel removal	" "	0.006	" "
Total	" "	-	" "

7.4 Comments to National Reporting Table T7

- The bamboo wood fuel removal refers to Assossa town and only lowland bamboo is considered (WBISPP (2003), “Urban Energy and wood Utilisation survey, Assosa town, Beneshagul gumuz Region).
- 20% of living culms, i.e, 1.5 million tons of oven-dry culms per year of monopodial bamboo could have been obtained for use in large and small-scale industries, as well as for household consumption.
- The total living lowland/sympodial bamboo culms available amounts to 16.6 million tons of oven dry biomass (Anonymous, 1997). One third of this resource, i.e. 5.5 million tons, could have been harvested every year without adversely affecting sustainability provided that appropriate management is implemented.

8 Table 8 – Value of Wood Removal

8.1 GBRA 2005 Categories and Definitions

Category	Definition
Bamboo Wood removal	The Bamboo wood removed (volume) for production of goods and services other than energy production (woodfuel).
Woodfuel Bamboo removal	The Bamboo wood removed for energy production purposes, regardless whether for industrial, commercial or domestic use.

8.2 National Data

8.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Sympodial & Monopodial bamboo	M	highland & lowland	1997	

8.2.2 Classification and definitions

National class	Definition
Bamboo on forest land	Bamboo on forest and farmers land (Planted)

8.2.3 Original data

8.3 Data for National Reporting Table T8

GBRA2005	Value (million USD)		
	1990	2000	2005
Bamboo wood removal	Na	Na	Na
Bamboo wood fuel removal	Na	Na	Na
Total			

8.4 Comments to National Reporting Table T8

- Neither volume nor price data is available.

9 Table 9 – Non Wood Bamboo Product Removal

9.1 GBRA2005 Categories and Definitions

Category
Plant products / raw material
1. Food
2. Raw material for medicine and aromatic products
3. Raw material for utensils, handicrafts & construction
4. Ornamental plants
5. Other plant products
Animal products / raw material
1. Living animals
2. Other edible animal products
3. Other non-edible animal products

9.2 National Data on Bamboo Resources

9.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Sympodial & Monopodial bambbo	M	highland & lowland	1997	

9.2.2 Classification and definitions

9.2.3 Original data

9.3 Data for National Reporting Table T9

GBRA 2005 Categories	Scale factor	Unit	NWFP removal		
			1990	2000	2005
<u>Plant products / raw material</u>					
1. Food (bamboo shoots)	Na	Na	Na	Na	Na
2. Raw material for medicine and aromatic products	Na	Na	Na	Na	Na
3. Raw material for utensils, handicrafts & construction	Na	Na	Na	Na	Na
4. Ornamental plants	Na	Na	Na	Na	Na
5. Other plant products	Na	Na	Na	Na	Na
<u>Animal products / raw material (if any)</u>					
1. Living animals	Na	Na	Na	Na	Na
2. Other edible animal products	Na	Na	Na	Na	Na
3. Other non-edible animal products	Na	Na	Na	Na	Na

9.4 Comments to National Reporting Table T9

- Although there are some people who use bamboo shoots for their diet, particularly, in Benshangul Gumuz region, there is no data available to quantify the exact amount used in this regard.

10 Table T10– Value of Non Wood Bamboo Product

10.1 GBRA 2005 Categories and Definitions

10.2 National Data on Bamboo Resources

10.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Sympodial & Monopodial bambbo	M	highland & lowland	1997	

10.2.2 Classification and definitions

10.2.3 Original data

10.3 Data for National Reporting Table T10

GBRA 2005 Categories	Value of the other than culms removal (Million USD)		
	1990	2000	2005
Plant products / raw material			
1. Food (bamboo shoots)	Na	Na	Na
2. Raw material for medicine and aromatic products	Na	Na	Na
3. Raw material for utensils, handicrafts & construction	Na	Na	Na
4. Ornamental plants	Na	Na	Na
5. Other plant products	Na	Na	Na
	Na	Na	Na

10.4 Comments to National Reporting Table T10

- No data available.

11 Map of country's bamboo resources distribution

Please attach a map of bamboo distribution in the country with explanatory notes

- **The attached maps include the following;**

1. South West Ethiopia Reconnaissance Forest Inventory- Areas of Highland Bamboo Land Cover (Chaffy, 1975)
2. Benshangul Gumuz Regional State, Areas of Lowland Bamboo,(LUSO consult, 1979)

12 List of bamboo species in the country

Please attach list of the main bamboo species in the country:-

There are only two indigenous species of bamboo in Ethiopia, the highland or African alpine bamboo, *Arundinaria alpina* k.schumann and a monotypic genus, lowland bamboo, *Oxytenanthera abyssinica* A. Richard Munro.

List main uses, quantity, value of the bamboo removal Add the table: list of the main pest species

- 67% of African bamboo resources and more than 7% of the world total area is found in Ethiopia. However, except for domestic use the country is not getting the most economic advantage out of it.



- Current use of highland bamboo (*Arundinaria alpina*) is for furniture (traditional processors and modern workshops), house construction, fencing, water storage/ water pipes, baskets, agricultural tools, beehives, household utensils and various artifacts. Its potential industrial uses could be for bamboo panels, bamboo curtain, gas generator etc.

- The demand of bamboo culms and goods are always greater than the supply. The price of one average culm in the major cities, as of 2005 is ETB 7.00 (USD 1 = ETB 8.68, 2005). The average height and diameter of one bamboo culm is 18m and 8.5cm. Its price is increasing from time to time since, its importance in the local market is increasing and no other plant provides as many services as bamboo especially for the low income families. The low level of its utilization is due to bamboo susceptibility to biological and physical damages, as well as less acceptance by both potential investors and growers as the technology is not developed yet.

REFERENCE:

1. Breitenbach.F.(1961) Bamboo a source of cellulose. Ethiopian Forestry Review 1:21-23
(Bref description of *O. abyssinica* and discussion of potential for producing paper)
2. Fanshaw,D.(1961) The bamboo, *O.abyssinica* – its ecology, silviculture and utilization.Kirka8:157-166
3. Kigomo, B.N.and Kamiri, J.F.(1985) Observation on the growth and yield of *Oxythenanthera abyssinica*(A. Rich) Munuro in Plantation. East African Agricultural and Forestry Journal 51:22-29.
4. LUSO CONSULT GmbH.(1997) Study on Sustainable Bamboo Management (Final report), Hamburg,Germany
5. Mooney, H.F.(1959) A report on the bamboo forests of Wallega Province(Ethiopia) with a view to their possible utilization for paper pulp. Report of the Forestry Advisor, British Middle East Development Division, 8 pp.(unpublished report)
6. Wimbush,S.H(1945) The African Alpine Bamboo. Empire Forestry Journal 24:33-39(Though concerned with *Arundinaria alpina*, gives use full data on yields and how to age culms }

**SOUTHWEST ETHIOPIA
RECONNAISSANCE FOREST
INVENTORY (CHAFFEY) 1975
AREAS OF
HIGHLAND BAMBOO
(*Arundaria alpina*)**

-  Bamboo thicket
-  Woodland with bamboo ticket



