



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

and



International Network for Bamboo and Rattan (INBAR)

**GLOBAL FOREST RESOURCES
ASSESSMENT UPDATE 2005**

PAKISTAN

**COUNTRY REPORT
ON
BAMBOO RESOURCES**

PESHAWAR MAY, 2005

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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 |
|--|-----------------|------------------------|---------|---|
| Cultivation of Bamboo in Pakistan Dr.K.M.Siddiqui | H | Bamboo Plantation Area | 1994 | Pakistan Journal of Forestry, April, 1994 |
| Survey of Bamboo Growing Areas in Punjab | H | Bamboo Plantation Area | 1995 | Annual Progress Report, Pakistan Forest Institute |
| Survey of Bamboo Growing Areas in Punjab | H | Bamboo Plantation Area | 2005 | Pakistan Forest Institute, Peshawar |

1.2.2 Classification and definitions

| National class | Definition |
|--------------------|--|
| Bamboo Plantations | Plantations of Bamboo raised on private lands as compact plantations on 0.5 acre of land. Bamboos found in areas other than forests. It corresponds to the definition of bamboo on other land of FRA 2005. |

1.2.3 Original data

| GBRA 2005 Categories | Area (1000 hectares) | | |
|------------------------|----------------------|------|------|
| | 1990 | 2000 | 2005 |
| Bamboo on forest land | | | |
| Monopodial bamboo area | NIL | NIL | NIL |
| Sympodial bamboo area | 9 | 14 | 20 |
| TOTAL | 9 | 14 | 20 |

1.4 Comments to National Reporting Table T1

Efforts were made in eighties to introduce different species of bamboos from Bangladesh, China, Sri Lanka and Thailand in to Pakistan. Some of them are well adapted to climatic conditions of Punjab. 21 species were introduced from Bangladesh and 4 from Thailand and China. Some of the outstanding species in this regard are *Dandrocalamus giganteus*, *Dandrocalamus stictus*, *Bambusa arundinacia*, *Bambusa tulda*, *Dandrocalamus hamiltonii*, *Bambusa vulgaris*, *Dandrocalamus longispthus* and the ornamental species *Phyllostachys aureau*.

Bamboo plantations have been raised on good agricultural lands in Sargodha, Jhang, Khoshab and Mandibhauin districts of Punjab province in Pakistan. Most of these plantations are on 0.5 acres of lands. In Chunian sub division of Kasur district, small farmers have also successfully established small bamboo groves of 4-10 acres area. Bamboo plantation area increases or decreases with the market demand in the domestic as well as in the Middle East markets. *Dandrocalamus stictus*, *Bambusa tulda* and *Dandrocalamus hamiltonii* are the major species grown on private farmlands.

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 |
|--|-----------------|--------------------------------|---------|---|
| Cultivation of Bamboo in Pakistan Dr.K.M.Siddiqui | H | Ownership of Bamboo plantation | 1994 | Pakistan Journal of Forestry, April, 1994 |
| Survey of Bamboo Growing Areas in Punjab | M | Ownership of Bamboo plantation | 2005 | Pakistan Forest Institute, Peshawar |

2.2.2 Classification and definitions

| National class (Bamboo) | 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". |

2.2.3 Original data

2.3 Data for National Reporting Table T2

| GBRA 2005 Categories | Area (1000 ha) | |
|----------------------|----------------|------|
| | 1990 | 2000 |
| Private ownership | 9 | 14 |
| Public ownership | Nil | Nil |
| Other ownership | Nil | Nil |
| Total | 9 | 14 |

2.4 Comments to National Reporting Table T2

Bamboo plantations have been raised on private agricultural lands in Punjab Province of Pakistan under agro-forestry system. Plantation area increases or decreases with the demand in the market especially in the export markets. Demand for bamboo in the local market is also influenced by the timber prices in the market.

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 |
|--|-----------------|------------------------|---------|---|
| Cultivation of Bamboo in Pakistan Dr.K.M.Siddiqui | H | Bamboo Plantation Area | 1994 | Pakistan Journal of Forestry, April, 1994 |
| Survey of Bamboo Growing Areas in Punjab | M | Bamboo Plantation Area | 1995 | Annual Progress Report, Pakistan Forest Institute |
| Survey of Bamboo Growing Areas in Punjab | M | Bamboo Plantation Area | 2005 | Pakistan Forest Institute, Peshawar |

3.2.2 Classification and definitions

| National class | 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. |

3.2.3 Original data

3.3 Data for National Reporting Table T3

| GBRA 2005 Categories | Area (1000 hectares) | | |
|-----------------------|----------------------|-----------|-----------|
| | 1990 | 2000 | 2005 |
| Natural bamboo forest | NIL | NIL | NIL |
| Plantation | 9 | 14 | 20 |
| TOTAL | 9 | 14 | 20 |

3.4 Comments to National Reporting Table T3

Almost 100 percent bamboo resources are on private farms. Farmers in Punjab either raise pure stand of bamboo or manage bamboo plantations with agricultural crops. Most of the farmers use rhizomes for planting bamboos. Shoot cuttings are also used for bamboo cultivation in Pakistan. Research studies conducted at Pakistan Forest Institute, Peshawar indicate that for maximum production, bamboo should be grown as pure crop at 2x2 m spacing. However, agricultural crops can be grown for some years if plant spacing is kept greater than 2x2 m.

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 2 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 |
|--|-----------------|---------------|---------|---------------------|
| Bamboo as a source of long fiber pulp in Pakistan by Kanwar.M. Suleman | H | Growing stock | 1994 | |

4.2.2 Classification and definitions

| Category | Definition |
|--|---|
| Bamboo Growing stock | Weight (tons) of all bamboo forest more than 2 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 5cm or more. |
| Growing stock of Common bamboo species | Weight (tons) of the most common bamboo species. |

4.2.3 Original data

4.3 Data for National Reporting Table T4

| GBRA 2005 Categories | Total weight (tons) | | |
|--|---------------------|---------|---------|
| | 1990 | 2000 | 2005 |
| Bamboo Growing stock | 93,000 | 144,000 | 206,000 |
| Commercial growing stock of Bamboo | 61,000 | 95,000 | 136,000 |
| Growing stock of Common bamboo species | 74,000 | 115,000 | 165,000 |

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

4.4 Comments to National Reporting Table T4

Average growing stock of bamboo grown on farmlands is estimated about 8 tons/per hectare. More than 66 percent of the growing stock is considered commercial growing stock having clum diameter of more than 5 cm. More than 80 percent of the growing stock consist of three major species i.e Dandrocalamus stictus, Bambusa tulda and Dandrocalamus hamiltonii.

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 |
|---------------------------------|-----------------|----------------------|---------|--------------------------------------|
| Bamboo Biomass Estimation Study | H | Above Ground Biomass | 2005 | Pakistan Forest Institute, Peshawar. |

5.2.2 Classification 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. |

5.2.3 Original data

5.3 Data for National Reporting Table T5

| GBRA 2005 Categories | Bamboo Biomass (ton dry weight) | | |
|--------------------------------|----------------------------------|--------|---------|
| | 1990 | 2000 | 2005 |
| Above-ground biomass of Bamboo | 51,000 | 79,000 | 113,000 |
| Below-ground biomass of Bamboo | 8,119 | 12,199 | 17,990 |
| Total of living biomass | 59,119 | 91,199 | 130,990 |
| TOTAL | 59,119 | 91,199 | 130,990 |

5.4 Comments to National Reporting Table T5

For the calculation of above ground biomass, a factor of 0.55 was multiplied with growing stock. For the estimation of below ground bio-mass a factor of 0.1592 was multiplied with the weight of above ground biomass.

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 |
|--|-----------------|-----------------------|---------|---------------------|
| Potential Distribution of Wood Bamboos in South, South-East and East Asia, Papua New Guinea and Australia Working Paper 42 UNEP-WCMC | H | Native Bamboo Species | 2001 | Nadia.et.al |
| A Note on Bamboo in Pakistan. Zahoor Ahmad National Agriculture Research Council (NARC), Islamabad, Pakistan | H | Native Bamboo Species | 2005 | |

6.2.2 Classification 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. |

6.3 Data for National Reporting Table T6

| GBRA 2005 Categories | Number of species (Year 2000) |
|--------------------------------------|-------------------------------|
| Native Bamboo species | 3 |
| Introduced Bamboo species | 13 |
| Critically endangered Bamboo species | 1 |
| Endangered Bamboo species | - |
| Vulnerable Bamboo species | - |

6.4 Comments to National Reporting Table T6

Bamboos are of limited diversity in Pakistan. Three species grow naturally in Pakistan. *Arundinaria falcata* in the NW Himalayas at 1,200-2,000 m. It occurs in the undergrowth in forests of oak, firs and mixed trees, usually on northern slopes or in ravines. It is part of a wider gene pool through the Himalayas. It is used for making baskets, mats and pipes. *Bambusa bambos*. It is rare in the Ravi river eastward. It is absent in the hills. This species is extensively used for construction. *Dendrocalamus strictus* is found in Punjab and Kashmir. It is found also in mixed vegetation on Marghalla hills surrounding Islamabad. It is used for construction and a variety of purposes. This forms part of a gene pool extending across Hindustan and usually growing below 1,200 m. In Pakistan, the resources are shrinking.

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 |
|--|-----------------|------------------------|---------|---|
| Survey of Bamboo Growing Areas in Punjab | M | Bamboo Plantation Area | 1995 | Annual Progress Report, Pakistan Forest Institute |
| Survey of Bamboo Growing Areas in Punjab | M | Bamboo Plantation Area | 2005 | Pakistan Forest Institute, Peshawar |

7.2.2 Classification and definitions

| National class | 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. |

7.2.3 Original data

7.3 Data for National Reporting Table T7

| GBRA2005 | Bamboo removal (ton) | | |
|-------------------------|----------------------|--------|---------|
| | 1990 | 2000 | 2005 |
| Bamboo wood removal | 61,000 | 95,000 | 136,000 |
| Bamboo woodfuel removal | NA | NA | NA |
| Total | 61,000 | 95,000 | 136,000 |

7.4 Comments to National Reporting Table T7

In Pakistan, almost all of the bamboo resources are on farmlands and bamboo is harvested by clear cutting the bamboo field and stumps are left for next crop. Generally the farmers prefer

the sale method in which all the marketing function are performed by the buyers. Leaves and small branches are left in the field which are used as fuel or for shelter.

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 |
|--------------------------------------|-----------------|------------------|---------|-------------------------------------|
| Survey of Bamboo Markets in Punjab. | H | Value of bamboos | 2005 | Pakistan Forest Institute, Peshawar |

8.2.2 Classification and definitions

| National class | Definition |
|---------------------|---|
| Bamboo Wood removal | The Bamboo wood removed (volume) for production of goods and services other than energy production (woodfuel). |

8.2.3 Original data

8.3 Data for National Reporting Table T8

| GBRA2005 | Value (million USD) | | |
|-------------------------|---------------------|-------|-------|
| | 1990 | 2000 | 2005 |
| Bamboo wood removal | 14.52 | 22.62 | 32.39 |
| Bamboo woodfuel removal | NA | NA | NA |
| Total | 14.52 | 22.62 | 32.39 |

8.4 Comments to National Reporting Table T8

In Pakistan, a thirty feet bamboo stem having 14-15 kg weight is sold at Rs 200 in the local market. Present estimates have been calculated on the basis of above mentioned market information. One U.S \$=60 Rupees.

9 Table 9 – Non Wood Bamboo Product Removal

9.1 GBRA2005 Categories and Definitions

| Category |
|--|
| <u>Plant products / raw material</u> |
| 1. Food |
| 2. Raw material for medicine and aromatic products |
| 3. Raw material for utensils, handicrafts & construction |
| 4. Ornamental plants |
| 5. Other plant products |
| <u>Animal products / raw material</u> |
| 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 |
|--------------------------------------|-----------------|-------------|---------|---------------------|
| | | | | |

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> | | | NA | NA | NA |
| 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 |
| <u>Animal products / raw material (if any)</u> | | | NA | NA | NA |
| 1. Living animals | | | NA | NA | NA |
| 2. Other edible animal products | | | NA | NA | NA |
| 3. Other non-edible animal products | | | NA | NA | NA |

9.4 Comments to National Reporting Table T9

Data not available

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 |
|--------------------------------------|-----------------|-------------|---------|---------------------|
| | | | | |

10.2.2 Classification and definitions

10.2.3 Original data

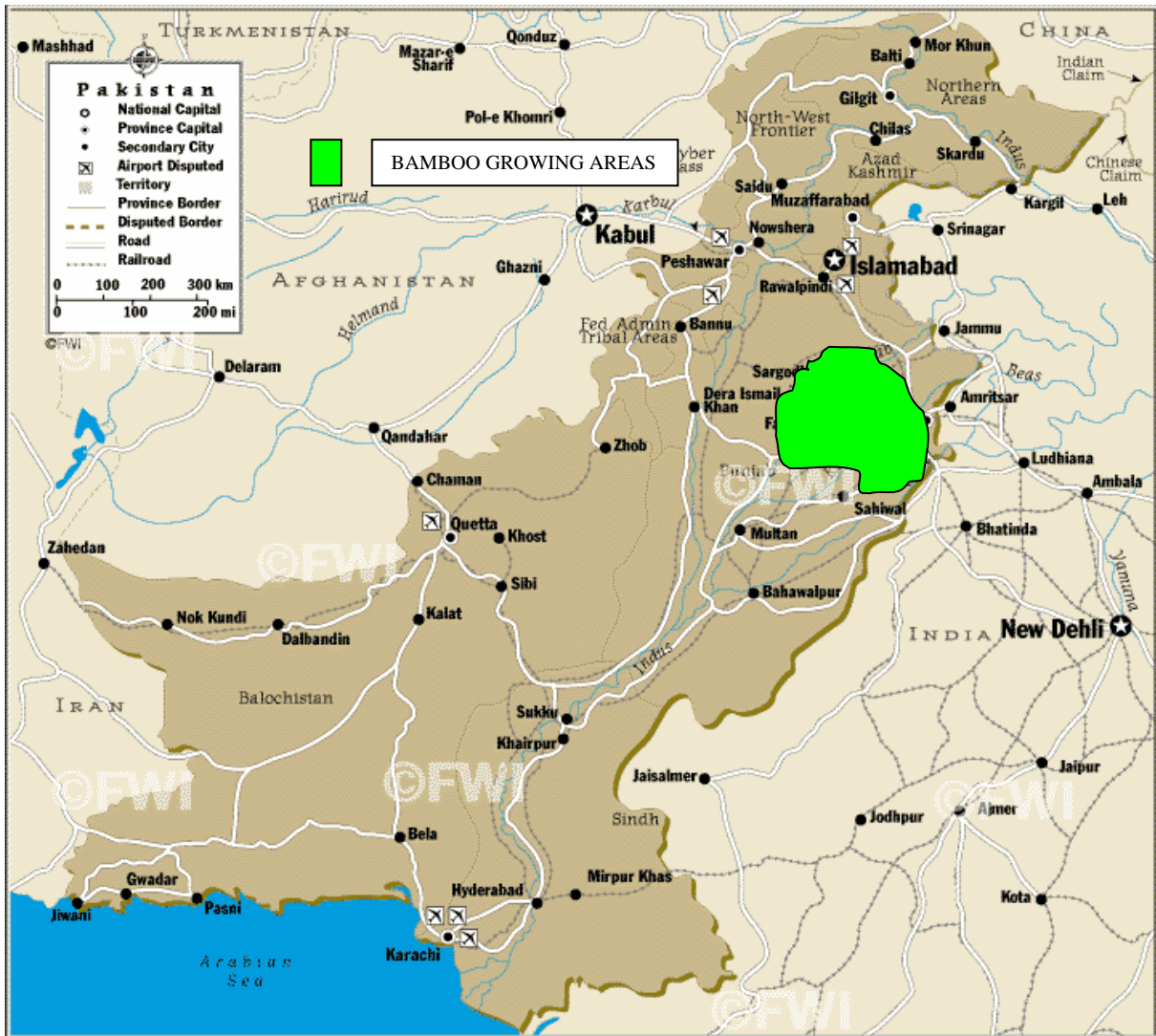
10.3 Data for National Reporting Table T10

| 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

Data not available.

11 Map of country's bamboo resources distribution



Bamboo plantations have been raised in Sargodha, Mandi Bhaudin, Kasur, Lahore, Khusab and Jhang areas of Punjab province. Most of the plantations have been raised under agro-forestry system on private farms.

12 List of bamboo species in the country

- *Dendrocalamus strictus*
- *Dendrocalamus giganteus*
- *Dendrocalamus hamiltonii*
- *Dendrocalamus longispathus*
- *Melocanna bambusides*
- *Arundinaria falcata*
- *Bambusa arundinacea*
- *Bambusa tulda*
- *Bambusa polymorpha*
- *Bambusa vulgaris*
- *Bambusa nutans*
- *Phyllostachys aurea*.
- *Phyllostachys pubescens*
- *Phyllostachys aureosulcata*
- *Bambusa bambos*
- *B. multiplex*

Arundinaria falcata It is used for making baskets, mats and pipes.

Bambusa bambos This species is extensively used for construction.

B. multiplex in the plains of Punjab is a hedge bamboo.

Dendrocalamus strictus It is used for construction and a variety of purposes.

Dendrocalamus hamiltonii is used for construction and ladder manufacturing and scaffoldings

Bambusa tulda used for construction purposes.

