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BAMBOO VISION DOCUMENT & SECTOR STUDY

Tripura

tbm
TRIPURA
Bamboo Mission

(Department OF Industries & Commerce)
Government of Tripura
Agartala

Implemented by:

IL&FS | Clusters

Bamboo Resource

(Part-I)

Chapter 01

Background

Bamboos popularly known as 'Green Gold', 'Poor Man's Timber', etc belonging to the family Gramineae**,** are represented world over by about 90 genera with over 1200 species. Asia is rich in bamboo diversity with approximately 900 species belonging to 65 genera, of which 14 species are endemic to the region. India is the home of about 136 species of bamboo falling under 23 genera with genus *Bambusa* widely distributed in the country. The next widely distributed genus is the *Dendrocalamus*, which is found to grow widely in the plains of south and central India.

Bamboos can generally adapt to wide range of climatic and edaphic conditions. They have multiple utilities and are found to grow rich in moist deciduous, semi evergreen, tropical, sub tropical and temperate forests preferring rainfall of 1000-6000 mm but *Dendrocalamus strictus* occur in low rainfall area of 750 – 1000 mm. Bamboos are fairly well represented in all the continents except in Europe and Western Asia.

According to FSI estimate, about 8.96 million hectares is covered by bamboo forests in India, which is equivalent to approximately 12.8% of total forest cover of the country. North Eastern States represent 28%, Madhya Pradesh 20.3%, Maharashtra 9.9%, 8.7% in Orissa, 7.4% in Karnataka, and remaining states (GoI, 2002). CBTC (2008) however estimates that both planted and natural bamboo occupies 11.4 million hectares in India, representing 16.7% of total forest area and 3.4% of the total geographical area of the country.

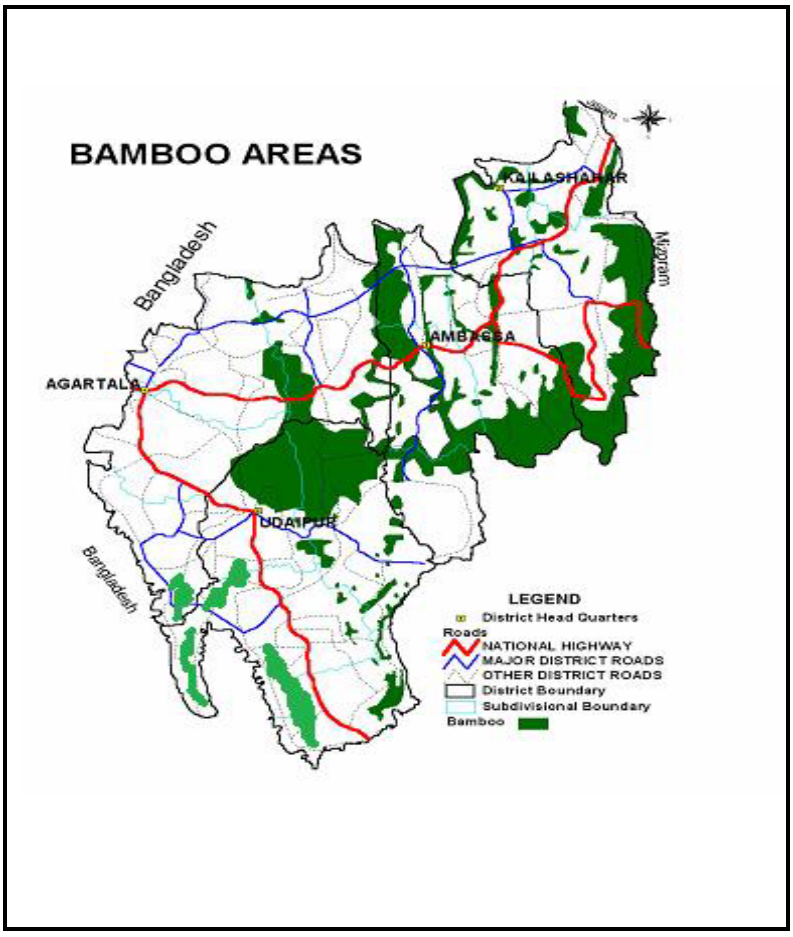
The bamboo resource is spread over about 2397 km^2 of the state forming about 23% area of the state. Pure bamboo brakes are found to occur in the state over 938 km^2, which is approximately 9 % of the forest area (Tangwan, 1995). Bamboo forests mixed with other miscellaneous trees occur over 1350 km^2. Bamboo in small private holdings occur over 109 km^2 with Bari, Barak, Rupai and Kanak Kaich as major bamboo species (D K Sharma, 2008).

Forest Survey of India, Eastern Zone, Kolkata had carried out inventory of Bamboo in Tripura during 1989-90 in bamboo forest area including private bamboo area over 4417 Sq. Km in four vegetative strata – Miscellaneous with Bamboo (766 Sq. Km.), Bamboo (938 Sq. Km.), Plantation (1736 Sq. Km.) and Shifting cultivation (975 Sq. Km.). From the data on growing stock of Bamboo (of all strata), proposed yield of Bamboo in the state was found to be 180 million bamboo/ 217604 MT per year (FSI, 1993; TFD, 2007).

Table.1. Growing Stock of Bamboo in Tripura and Proposed Yield

Parameters		Clump Forming Bamboo		Non-Clump Forming Bamboo	
		Nos.	Weight	Nos.	Weight
Growing Stock	Average / Ha.	58.95	94.93 Kgs.	1058.36	1255.08 Kgs.
	Total of State	38.01 m	61230 MT	682 m	809230 MT
Yield (Taking 4 years rotation): Total Yield: 180 million / 217604 MT		9.5 million	15307 MT	170.5 million	202307 MT

(FSI, 1993; TFD, 2007)



(FSI, 1993)

Bamboo forests of Tripura can be divided into two classes as per the silvicultural classification of Champion and Seth- (i) the Moist mixed deciduous forests and (ii) the Secondary moist bamboo brakes. Bamboo Policy of Tripura State (TFD, 2001) has been formulated for conservation of bamboo in forests and its development in farm lands, value addition and market driven community based utilization. Economically important bamboo species recorded from the state and their utilization are given in the following table 1.a.

Table 2. Species and their utility.

Local name	Botanical name	Incense	Handicrafts	Mats	Furniture	Other Uses
Kanakaich	*T. oliveri*		X		X	Fishing rods, javelins
Barak	*Bambusa balcooa*				X	Scaffolding
Bom	*Bambusa cacharensis*		X	X	X	
Mal/Makhla	*Bambusa pallida*		X	X		
Paura	*Bambusa polymorpha*	X	X	X		
Mirtinga	*Bambusa tulda*	X	X	X		Edible shoots; paper mills
Bari/Jai	*Bambusa vulgaris*		X		X	Fencing, shoots, paper
Rupai	*Dendrocalamus longispathus*	X	X	X	X	Paper
Lathi Baans	Dendrocalamus strictus		X		X	Paper; edible shoots
Muli	*Melocanna baccifera*	X	X	X		Utility items, shoots, paper
Dolu	*Schizostachyum dullooa*		X	X		Handicrafts

(TBM Report 2006)

Muli bamboo comprised of about 80 % (approximately 1917 km^2) of the bamboo resource of the state before the species underwent gregarious flowering between the year 2003 to 2009. Muli bamboo is the only non-clump forming bamboo of the state and also it used to be the most widely used bamboo species due to its easy workability and availability.

State Bamboo Policy (TFD, 2001) proposes to create 50000 hectares of Bamboo ANR and 10000 hectares of Bamboo AR in forest area and 5000 hectares of Bamboo plantation in private lands. However, 11,257 hectares of bamboo plantation (AR) has been created by Forest Department under various schemes from 1999-2000 to 2006-07 in the state, out of which about 92% is of Muli bamboo (D K Sharma, 2008).

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Chapter 02

Current scenario & intervention by the government

Natural bamboo forests have been recorded as 2397 km^2 in Tripura (Tangwan, 1995) before Muli bamboo started its flowering in the state in 2003. However, it is to be noted that about 80% (i.e. 1917 km^2) of the total bamboo stock available in the state has been recorded as Muli bamboo. In that case, the area under natural occurrence of non-muli bamboo in the state is about 480 km^2 only.

2.1.Present status

Forest department, Tripura has started raising large scale bamboo plantations only from FY 2005-06 after Muli bamboo started gregariously flowering in 2003, through the scheme MGFMB (Management of Gregarious Flowering of Muli Bamboo). Since then 19,093 ha of Muli bamboo plantations have been created in the state in the last five financial years. However, only 1996 ha of economically important Non-muli bamboo species plantations have been created during the said period. This is only 10.45% of the total bamboo plantations created during the past five years. Many of these Non-muli plantations are also found to be under-stocked due to various reasons like grazing, damage due to forest fire, lack of protection, drought, untimely and unscientific planting, lack of timely cultural practices like weeding and earth mounding, etc.

Therefore, enrichment planting can be taken up to make the already existing plantations fully stocked and more productive.

Scope for expansion

No immediate need was probably felt before Muli bamboo started gregariously flowering, to expand the area of bamboo plantations in the state. There are two reasons for this. Firstly, bamboo resources were available in adequate quantity in the vicinity of rural habitations for satisfying the demand of rural handicraft sector. Secondly, though bamboo handicrafts of the state were of high quality and popular, the handicraft sector remained poorly developed until initiatives for increasing the production base of bamboo handicrafts was taken up in mission mode by establishing Tripura Bamboo Mission in the state. As, the handicraft sector remained under-developed in the state, and only a limited number of artisans were involved in bamboo handicrafts making, there has been only a limited utilisation of economically important bamboo species in the state.

However, there has been remarkable increase in the revenue generated from bamboo handicraft sector in the last three years due to the initiatives taken by Tripura Bamboo Mission. This has resulted in resource crisis of economically

important bamboo species. This has also brought in a positive change in the mind-set of people towards raising of bamboo plantations.

Need for expanding bamboo resource base

Need for raising of bamboo plantations has been felt only after the Muli bamboo started flowering gregariously in the state and its resultant crisis of bamboo for local consumption. Efforts have been made by the State Forest Department to protect the areas where Muli bamboo flowered from biotic damage so as to manage and maintain the natural resource base of muli bamboo in its natural habitat.

Adequate emphasis on raising of bamboo plantations has begun in the state from the year 2005 only. Since then, 21089 ha of plantations of various bamboo species have been created. Bamboo plantations created till 2001-10 are given year-wise in the *table.2*. It is encouraging to note that remarkable achievement has been made in broadening the bamboo resource base of the state in the last three years.

Table.3. Bamboo plantation area (Forest Department, 2010)

Financial Year	Area (in Ha)
2005-06	3091.4
2006-07	1543.2
2007-08	5905.1
2008-09	5554.4
2009-10	4994.7
	21088.8

(Statistics of Forest Department, 2010)

Plantation scenario in the past five years

Details of year-wise and species-wise bamboo plantations created in the state are given in *table.3*. Muli bamboo plantations, due to easy availability of seeds during the period, have been created at a large scale. Funding through MGFMB (Management of Gregarious Flowering of Muli Bamboo) scheme has been another reason for the impetus given to create artificial plantations and Aided Natural Regeneration of Muli bamboo. However, it's important to note that the initiatives have been taken by the state forest department to create plantations of other economically important bamboo species has also begun in the year 2005 only. It's mainly due to the boom in bamboo handicraft sector like agarbhatti stick making, mat making, etc as large number of forest dependent communities have taken up making of bamboo handicrafts as livelihood income generation activity because of the awareness and training programmes conducted under National Bamboo Mission scheme by Tripura Bamboo Mission and Forest Department, Tripura.

Tackling bamboo resource crisis

Over-utilisation of natural resource base of bamboos like Mritinga, Paura, Bom, etc in the bamboo handicrafts industry has resulted in serious resource crisis of economically important non-muli bamboo species in the state. However, the resource crisis can be viewed as an opportunity rather than a threat to the bamboo sector in the state as bamboo based livelihood income generation can become sustainable in rural household economy of the state by adequately expanding the resource base of economically important non-muli bamboo species. Growing economically important non-muli bamboo species has therefore become mandatory to sustain and promote the bamboo handicraft sector in the state.

Bamboo plantations created year-wise over the past five years, illustrated in *Figure.1 & 2*, shows that more than 78% of the total bamboo plantations i.e. 16454 ha of a total of 21088 ha have been created in the last three years only. And, 90% (i.e.14792 ha out of 16454 ha) of these are muli bamboo and the rest (i.e. about 10%) comprises of non-muli bamboo species. Area of bamboo plantations created (in percentage) in the last five years is illustrated in *Figure.3*.

Preparation of planting stock

Though non-availability of planting material of non-muli bamboo species has been the major cause behind the dismal achievement in expanding the resource base of these bamboo species in the past years, attempts to vegetative propagate the thick walled economically important non-muli besides growing seedling nurseries of Dolu (*Scizostychium dulloa*), Bom (*B. cacherensis*), Makal (*B. pallida*) and Mritinga (*B. tulda*) which has started sporadically flowering during 2010 in *Cachar* areas of Assam and also in various parts of Tripura. Initiatives, though already taken by Tripura Bamboo Mission & Forest Department in this line, need more concerted and coordinated efforts to achieve the desired goal of adequately broadening the resource base of non-muli bamboo species.

Table.4. Species-wise & Year-wise bamboo plantations created from FY 2005-06 to 2009-10

Year	Muli	Bari	Borak	mritinga	pecha	kanak	Bom	ruapi	kailai	Lathi	paura	total
2005-06	3091.41	0	0	0	0	0	0	0	0	0	0	3091.4
2006-07	1207.45	150.75	35	0	0	35	115	0	0	0	0	1543.2
2007-08	5200.37	200	97.35	150.39	41.94	179.82	0	35.25	0	0	0	5905.1
2008-09	4805.99	339.05	44	126.15	42.55	87.65	5	0	70.5	33.5	0	5554.4
2009-10	4787.7	94	0	20	30	10.15	0	0	5	0	47.8	4994.7
Total	19092.92	783.8	176.35	296.54	114.49	312.62	120	35.25	75.5	33.5	47.8	21088.8

(Statistics of Forest Department, 2010)

Figure.1. Area (in *hecatres*) of bamboo plantations created during the last five years

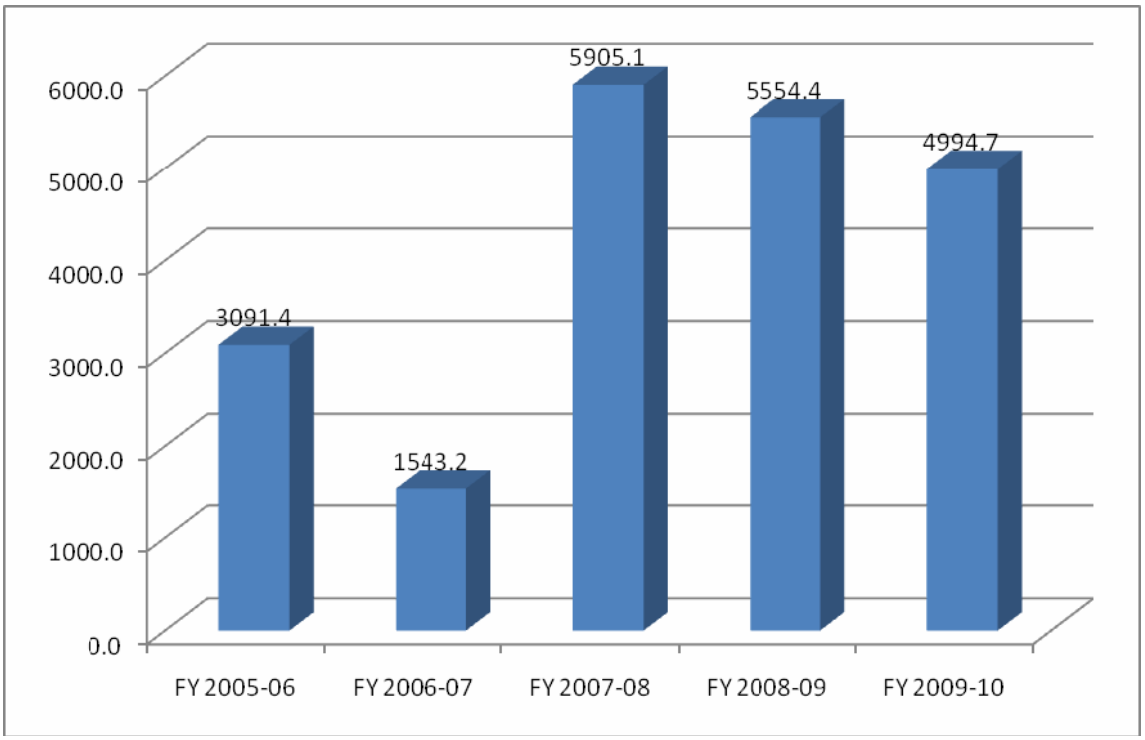
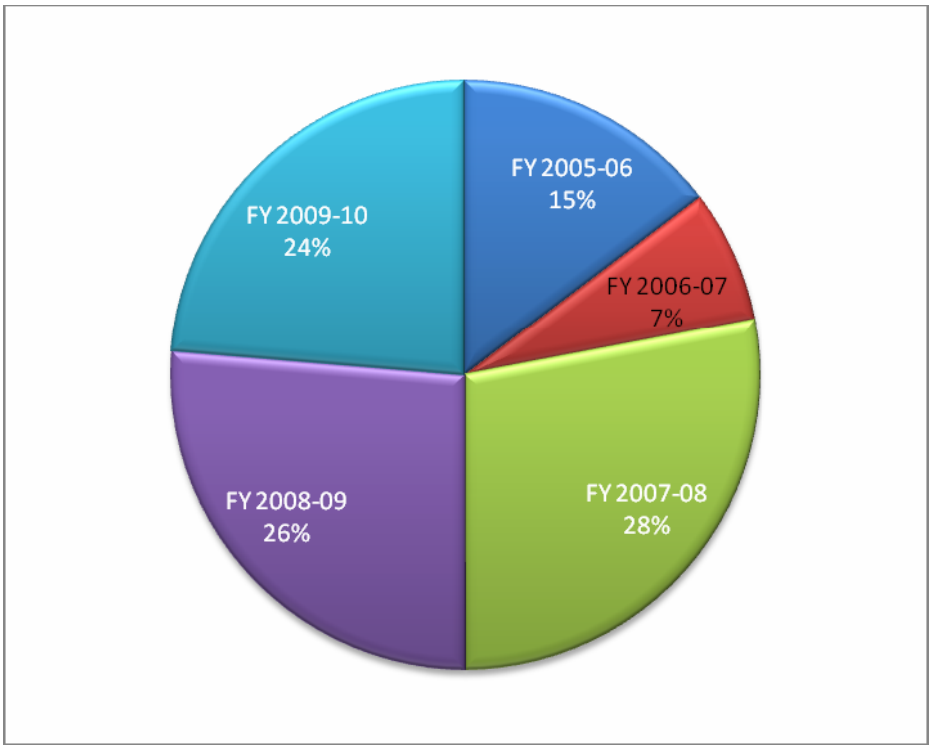


Figure.2. Area (in *percent*) of bamboo plantations created during the last five years



Varied performance of forest divisions

Detailed account of plantations (species-wise and forest division-wise) created in the state during the past five years is furnished in *Table.5*. Comparison of bamboo plantations of various species created among various forest divisions during the last five years indicate that attempts have not been made uniformly in all the forest divisions to raise plantations of non-muli bamboo species, even the species like *B.vulgaris* and *B.balcooa* which respond quite well to macro propagation through branch and nodal culm cuttings. Of course, significant efforts have been taken to raise non-muli bamboo species in certain forest divisions viz., Sadar, Gumti and Bagafa. However, the more concerted and co-ordinated efforts should be taken across the state in a planned and systematic manner to adequately expand the accessible resource base of economically important non-muli bamboo species.

Making use of the opportunity

Division-wise bamboo plantations created in the last five years illustrated in *Figure. 4 & 5* shows that certain divisions like Kanchanpur, Bagafa, and Teliamura have more appropriately used the period of occurrence and its resultant and imposed challenge/ opportunity of gregarious flowering of muli bamboo for creation of large scale muli-bamboo plantations. Similar attempts are to be taken up, but by all the forest divisions, to raise large scale plantations of species viz, Dolu (*Scizostychium dulloa*), Bom (*B. cacherensis*), Makal (*B. pallida*) and Mritinga (*B. tulda*) which have started flowering during 2010 in *Cachar* areas of Assam and also sporadically in various parts of Tripura. Timely collection and sowing of seed in mother beds and raising of dedicated polybag nurseries of these species in all the forest divisions should be made compulsory.

Table.5. Bamboo plantations of various species raised in Tripura in the last 5 (five) years-2005-06 to 2009-10

Division	*Muli*	*Bari*	*Barak*	*Mritinga*	*Pecha*	*Kanak Kaich*	*Bom*	*Rupai*	*Kailayi*	*Lathi*	*Paura*	*Total*
Sadar	1623.77	90.21	40	20.39	43.44	174.97	57.5	0	15	12.3	47.8	2125.4
Udaipur	2255.8	58.9	24.35	0	0	43	0	0	0	9	0	2264.8
Bagafa	2281.51	153.7	60	219.5	15	20	0	13	0	7.2	0	2782.9
Trishana	855.14	90	0	9.65	7.5	2	0	0	8	0	0	1011.2
Gomti	851.4	167.59	30	12	43.55	8.15	0	2.25	0	5	0	1164.3
Teliamura	2640.2	87	17	0	0	19.5	42.3	0	52.5	0	0	2888.5
Ambasa	1842.29	61.4	0	0	0	0	0		0	0	0	1903.7
Manu	2108.64	10	0	0	0	0	0	0	0	0	0	2118.6
Kailasahar	891.52	45	5	35	5	25	5	0	0	0	0	1011.5
Kanchanpur	3291.4	20	0	0	0	20	0	20	0	0	0	3351.4
Sipaijala	451.25	0	0	0	0	0	15.2	0	0	0	0	466.5
Total	**19092.92**	**783.8**	**176.35**	**296.54**	**114.49**	**312.62**	**120**	**35.25**	**75.5**	**33.5**	**47.8**	**21088.8**

(Statistics of Forest Department, 2010)

Figure.3. Division-wise area (in *hecatres*) of bamboo plantations created during the last five years

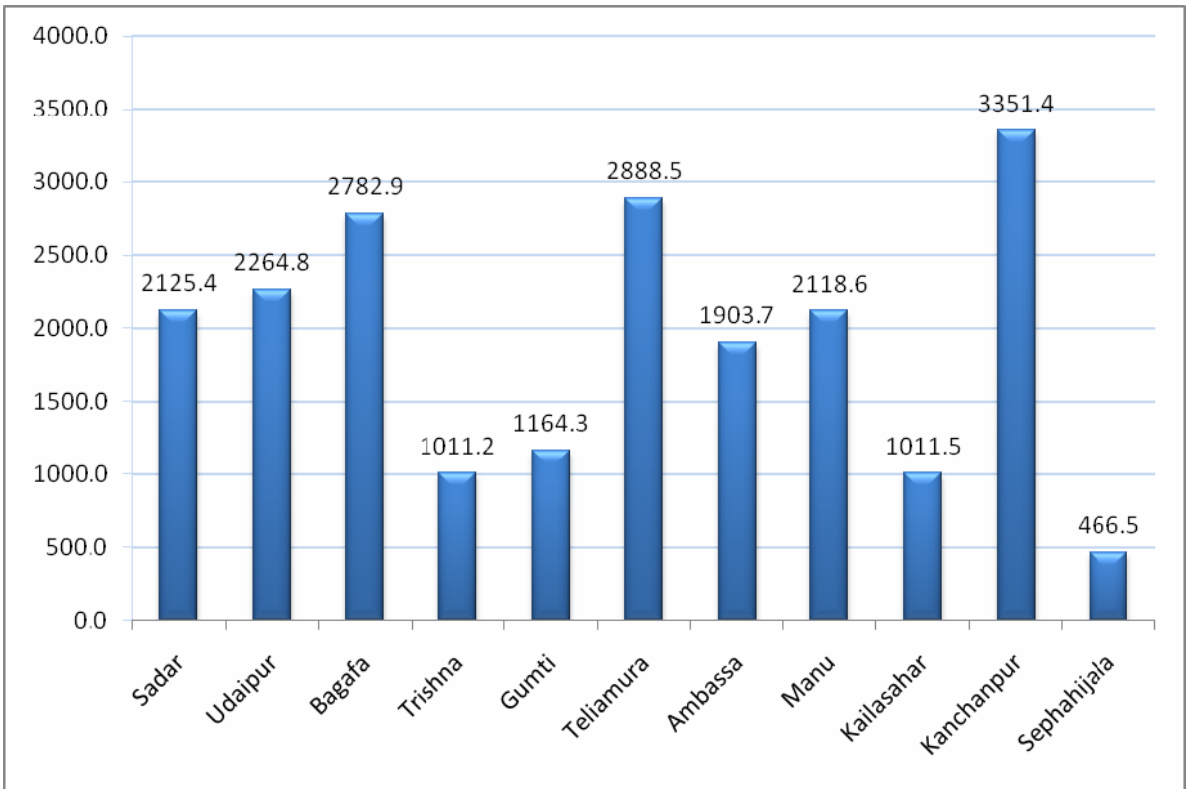
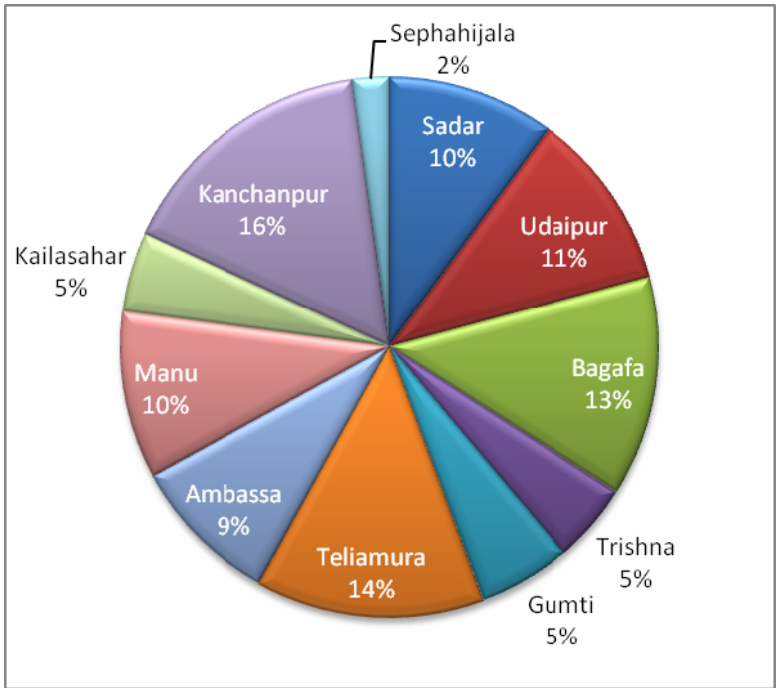


Figure.4. Division-wise area (in *percent*) of bamboo plantations created during the last five years



Percentage of Non-Muli against Muli bamboo plantations

From the statistical records of forest department on plantations of Muli and Non-Muli bamboos created in the past five years (Table.5), it could be understood that only 1995 ha of non-muli bamboo plantations i.e only 10.45 % of the total bamboo plantations have been created in the state, in the last 5 years, against 19093 ha of Muli bamboo plantations. The figure is obviously less. The status of achievement of Non-muli bamboo species against muli over the past half-a-decade in the state is diagrammatically illustrated in the *Figures 5 & 6*. The major reason behind taking up of non-muli bamboo plantations have been the non-availability of planting materials of other non-muli bamboo species.

Table.6. Percentage of Non-Muli against Muli bamboo plantations created in the last five years

Year	**Muli plantations (ha)**	**Non-Muli plantations (ha)**	**% of Non-Muli against Muli plantations**
FY 2005-06	3091.41	0.0	0
FY 2006-07	1207.45	335.8	27.81
FY 2007-08	5200.37	704.8	13.55
FY 2008-09	4805.99	748.4	15.57
FY 2009-10	4787.7	207.0	4.32
	19092.92	1995.9	10.45

Figure.5. Area of Non-Muli against Muli bamboo plantations created in the last five years

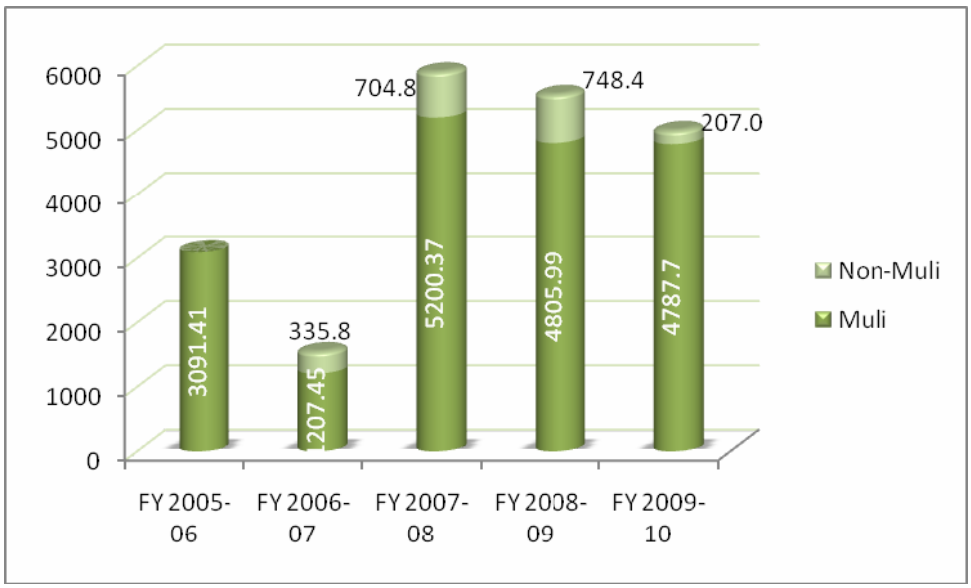
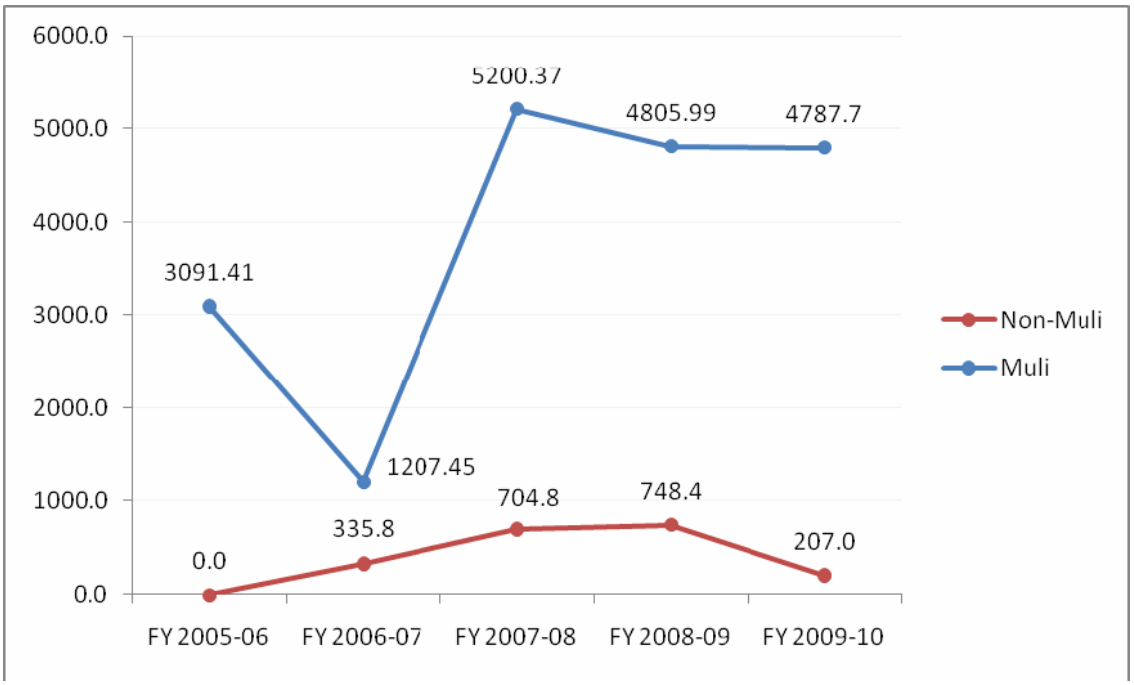


Figure.6. Trend of Non-Muli against Muli bamboo plantations created in the last five years



2.2. Bamboo resource development schemes in Tripura (D K Sharma, 2008)

National Bamboo Mission

The National Bamboo Mission is a Centrally Sponsored Scheme, in which the contribution of the Central Government is 100%. Forest department has been designated as the nodal agency for executing the CSS-NBM of the NBM in Tripura. Forest dept conducted its field activities through ten (10) Forest Development Agencies (FDAs) (except Sephahijala FDA) in the state. The four years (FY 2006-07 to 2009-10) of the NBM programme have been significant with substantial investment of around Rs 9 crores in activities promoting awareness pertaining to bamboo products and expanding the product portfolio leading to rediscovering Bamboo in the 21st century in general and asset creation in particular. A total of 3745.2 ha of non-muli bamboo plantations have been grown in the state from FY 2006-07 till FY 2009-10 under this scheme.

Table.7. Bamboo Plantations grown under NBM scheme

Financial Year	Bamboo plantations grown (in ha)
2006-07	12.00
2007-08	491.46
2008-09	2084.56
2009-10	1157.15
Total	3745.15

(Statistics of Forest Department, 2010)

Tripura-JICA Project Efforts on augmentation of Bamboo Resources

It is a eight year program starting from the year 2007-08.

1. The Project Component- Special Package for 16 Regrouped Village of Shifting Cultivators
    - It has the target of raising 400 ha of Bamboo & Cane plantation.
    - Aided Natural Regeneration over 1300 Ha. including Bamboo plantation.

2. The Project Component- JFM Community Development
    - Agro-forestry /Medicinal plants = 530 + 4770 ha, which also include Bamboo plantation.

3. The Project Component- on Forest Rehabilitation through JFM
    - Bamboo plantation = 8400 ha (direct sowing) & 4900 ha (seedling) and Aided Natural Regeneration of Muli & other bamboo = 8300 ha. About 200 Ha. Bamboo plantation of Non-Muli Bamboo species has been created during 2008-09.

4. The Project Component- on Farm Forestry

- Establishment of DPN = 100 sites, also includes Bamboo component.

5. Project Component- on establishment of the NTFP Center of Excellence (NCE)

- It shall play the pivotal role and act as the Nucleus Centre for all the activities including value addition, research on productivity, tie up between artisans and entrepreneurs, extension through superior technology from abroad and marketing on Bamboo so that the superior technology can be tapped for all round development of bamboo resources right from its production to the end use and financial return to the growers and artisans.

- The product marketing through organizing Tripura specific national and international exhibitions is proposed to be undertaken. The NCE with the help of the Project Management Consultants shall prepare a perspective plan for the bamboo sector development based on which the NCE shall forge a collaborative roadmap for transfer of the superior technology for training, research and marketing etc from Japan.

National Afforestation Programme

National Afforestation Programme (NAP) is implemented in the state through all the eleven (11) FDAs in the state. Growing of bamboo nurseries as well as plantations are important components of the scheme. 5449 ha of bamboo plantations of muli as well as non-muli bamboo species has been grown in the state from FY 2002-03 till FY 2009-10 under this scheme. Value addition training for making agarbhatti sticks, bamboo based handicrafts were given as Entry Point Activity (EPA) under this scheme.

Table.8. Bamboo Plantations grown under NAP scheme

Financial Year	Bamboo plantations grown (in ha)
2002-03	64.00
2003-04	532.23
2004-05	826.10
2005-06	997.50
2006-07	862.80
2007-08	1000.24
2008-09	749.61
2009-10	466.51
Total	5449.05

(Statistics of Forest Department, 2010)

Contribution of Indo-German Project to Bamboo Resource Development

About 30000 Ha. area will be treated by vegetative means under this project. Out of this about 6500 Ha. Bamboo plantation over the six year project period starting from 2009-10 is proposed under this project.

CSS Management of Gregarious Flowering of Muli Bamboo (MGFMB) Scheme

MGFMB a CSS scheme implemented in the state between FYs 2006-07 and 2008-09 aimed at regenerating the muli bamboo resources in the state. A total of 7781 ha of muli bamboo plantations have been grown in the state from FY 2006-07 till FY 2008-09 under this scheme.

Table.9. Bamboo Plantations grown under CSS-MGFMB scheme

Financial Year	Bamboo plantations grown (in ha)
2006-07	1543.2
2007-08	4082.1
2008-09	2155.3
Total	7780.6

(Statistics of Forest Department, 2010)

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Chapter 03

Production and Productivity

Raising the production and productivity of bamboo plantations is one of the prime objectives of National Bamboo Mission besides promoting marketing of bamboo-based products, including handicrafts. The mission aims at boosting the bamboo productivity in India from the present average level of 2 to 3 tonnes a hectare to about 18 tonnes a hectare (Ref.1).

Average productivity of bamboo resource is 0.73 MT/ha/year in the state, which is higher than All India Average of 0.51 MT/ha/year but much lower than 3.97 MT/ha/year of China (TFD, 2007).

3.1.Present productivity estimate

Present productivity report on bamboo plantations (as per the working plans of the state)

1. The yield in Mixed bamboo forests (i.e. Muli bamboo mixed with Mritinga, etc) is approximately 1.5 MT and in Mritinga bamboo forests the yield is normally 2 MT per ha.

Source: Second working plan for manu forest division for the year 2005-06 to 2014-15 by G R Paul, IFS, DCF & Sushanta Gupta, FTS, WP Dvn I, Agartala

2. Quantitative yield of bamboo
   a. Muli bamboo: Nos. Per ha = 10,000
   Per muli bamboo avg wt is 2 kg, so the yield per ha is 20,000 kg i.e. 20 MT
   b. Mritinga and other bamboos per ha = 100 nos.
   Per Mritinga bamboo avg wt is 10 kg, so the yield per ha is 1000 kg i.e. 1 MT

Source: Working plan for Teliamura FD from 2004-05 to 2013-14 by Haripada Das, IFS, DFO WP II Agartala

3.2. Potential Productivity Assessment

Table.10. Projected Productivity

Species	*prescribed spacing*[1]	*clumps /ha*[2]	*avg no. of culms/ yr/ clump*[3]	*total no. of culms/ yr/ ha* [4]	*avg wt of individual culm (kg)*[5]	*productivity/ ha (kg)*[6]	*productivity/ ha (in MT)*[7]
Mritinga	4.5 x 4.5	495	3	1485	5	7425	7.425
Bari	4.5 x 4.5	495	3	1485	6	8910	8.91
Barak	4.5 x 4.5	495	3	1485	9	13365	13.365
Bom/ Betua	4.5 x 4.5	495	3	1485	7	10395	10.395
Makal	4.5 x 4.5	495	3	1485	5	7425	7.425
Rupai	4.5 x 4.5	495	3	1485	3	4455	4.455
Paura	4.5 x 4.5	495	3	1485	4	5940	5.94
Kanak kaich	1.25 x 1.25	6400	2	12800	2	25600	25.6
Dolu	4.5 x 4.5	495	3	1485	5	7425	7.425
					Average	*10104*	*10.10*

[1] Prescribed spacing for cultivation of various species of bamboo

[2]Clumps/ ha will be accommodated in one ha area when a particular bamboo species is planted at prescribed spacing.

[3]Every clump of respective bamboo species will produce at-least three numbers of sprouts every year, if the clump is scientifically managed.

[4]Total number of culms which can be harvested from one hectare area annually

[5]Average weight of individual culms varies from species to species. Approximate minimum weight of culms is given against each species.

[6]Biomass Productivity/ ha (in kg) has been calculated by multiplying total no. of culms produced per year per ha with average weight (in kg) of individual culms respective species.

[7]Productivity/ ha (in Metric Tonnes)

The area under natural occurrence of non-muli bamboo is about 480 km^2 (i.e. 48000 ha) only as indicated under chapter 02, and the average productivity of bamboo resource is 0.73 MT/ha/year in the state. It means total annual non-muli bamboo resource production comes to 35040 MT only.

Whereas, it is to be noted that average potential productivity of bamboo resource in the state is 10.10 MT/ha/year (Table.9). Therefore, total annual non-muli bamboo resource production can be boosted to 484800 MT.

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Chapter 04

Future/ Projected requirement of bamboo (species wise)

Economically important bamboos grow/ cultivated in the state are mainly *B.tulda* (Mritinga), *B.pallida* (Makal), *B.cacherensis* (Bom/ Betua), *B.polymorpha* (Paura), *B.longispathus* (Rupai), *D.asper* (Asper), *S.dollua* (Dolu), *Thyrostachys oliveri (*Kanak kaich), *B.balcooa* (Barak) and *B.vulgaris* (Bari). A study has been conducted by Tripura Bamboo Mission on proposed future requirement of the plantations of the aforementioned species based on the annual requirement of the said bamboo species at the present consumption ratio (both internal as well as external consumption) and the results of the study are furnished in *Table 11*.

Table.11.Projected future plantation targets for various species of bamboo in Tripura

Bamboo species	Expected Productivity per ha (MT)	Estimated plantation area (in %)	Plantations to be raised in ha	Total annual requirement (MT)
Bambusa tulda (Mritinga)	7.42	28	6184	45882
B.cacherensis (Bom/ Betua)	10.4	18	3975	41341
B.polymorpha (Paura)	5.94	16	3533	20989
B.pallida (Makal)	7.43	11	2429	4923
B.balcooa (Barak)	13.37	8	1767	32479
Scizostychium dollua (Dolu)	7.43	6	1325	13127
B.vulgaris (Bari)	8.91	5	1104	9838
T. oliveri (Kanak Kaich)	25.6	5	1104	28268
D.longispathus (Rupai)	4.46	3	663	5910
Average	*10.10*	**Total**	**22084**	**202755**

4.1.Plantations required to be raised under existing as well as expected productivity limits

In the table above, species-wise plantations required to be raised has been arrived at based on a survey conducted on the potential for bamboo based handicrafts production. Accordingly, total area under non-muli bamboo plantations are expected to be 22084 ha and total annual requirement of identified non-muli bamboo species comes to 202755 MTs. This figure is, of course, based upon the expected annual productivity of 10.10 MT/ ha. However, the present average productivity of bamboo resources in the state has been estimated to be 0.73 MT/ha/year at present. At the present productivity rate of 0.73 MT/ha/year, the area under non-muli bamboo resource should be 13.8 times of 22084 ha (i.e. 304759 ha). It indicates that there is a huge gap between the existing and expected levels of production as well as productivity.

Estimated non-muli plantation area for handicrafts sector & household consumption

Again, 202755 MTs of annual production is only to meet the demand of handicrafts sector. Bamboo required for household consumption will be at least as much as the quantum required for handicrafts sector. Therefore, the total annual requirement of non-muli bamboo in the state will be twice the estimated plantation area to meet out the handicrafts sector in the state i.e. 22084 x 2 = 44168 ha. Whereas, only 1996 ha of non-muli plantations have been raised (Table.5) till FY 2009-10. Hence, there is a huge gap between the area where the plantations have been raised and the area where the plantations required to be raised to meet out the entire demand of state handicrafts sector and household consumption.

4.2. Enhancing present productivity

The following schedule is to be strictly followed to enhance the average productivity of the plantations from the present level of 0.73 MT/ annum / ha to potential average productivity of 10.10 MT/ annum / ha.

1. **Selection of species**: Species are to be appropriately selected so that it performs to its fullest growth potential in the soil condition of an area.
2. **Timely pitting**: Pitting is to be completed by March end. The dug-out soil should be allowed to weather for at least one month.
3. **Rhizome collection**: Rhizomes are to be collected soon after arrival of the first rain and are to be placed in transit nurseries.
4. **Poly bag seedlings**: Poly bag seedlings of at least 3 ft height are to be kept ready in the nursery at the end of May.
5. **Planting**: Planting should be done soon after on-set of monsoon in June. Only the sprouted rhizomes are to be transplanted from transit nursery to field. Adequate care not to damage the sprouts are to be taken while planting the rhizomes in the field. Polybag seedlings below 3 ft height should never be planted in the field.
6. **Soil mounding**: At the time of first weeding of plantation in July, earth mounding should be properly done as it enhances the shoot production.
7. **Fencing**: Fencing should be simultaneously completed at the time of planting to keep off the biotic pressure on the plantations. Periodical maintenance of fencing is also as much important.
8. **Maintenance**: Plantations are to be kept weed free, fenced, seedlings earth-mounded for initial three years.
9. **Management and Sustainable harvesting**: Proper harvesting methodologies are to be adopted so that the plantation yields maximum and at the same time sustainably.

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Chapter 05

Future strategy

Land allotted under RFR Act 2006

Forest rights of tribal and other forest dwellers has been recognised over approximately 1.6 lakh hectares of forest land which can be used by the right holder for generating his livelihood income. Rights have been recognised over 2 ha of forest land on an average for each right holder in the state. Two pronged strategy can be adopted to take up bamboo plantations in these land.

1. Bamboo plantations can be taken up in the land of interested right holders, immediately.
2. Awareness should be created among right holders to motivate them to create bamboo plantations in their land.

Regulated collection of rhizomes and shoots

By ensuring 100% stocking and also by carrying out cultural operations like earth mounding and weedings in time, the present productivity of bamboo plantations can immediately be increased to at-least 200% of the present level of productivity. Regulated collection of bamboo rhizomes (for creation of new plantations) as well as bamboo shoots (for food) will further help in sustaining the productivity of existing plantations.

Flowering of Makal, Bom, Dolu & Mritinga (*Raising of plantation of seed origin*)

Sporadic flowering *Bom* & *Mritinga* bamboos have been observed in Tripura and flowering of *Dolu, Makal* and *Bom* has been observed in *Cachar* region of Assam during this year (2010). Attempts have also been made to collect the seeds and raise seedlings in various territorial Forest Divisions of the state, Forest Research Division and Tripura bamboo Mission. Plantations which are going to be raised next year out of these zero age seedlings will form important germplasms for the respective species in the state and also in the NE region, which can be utilised as mother plant for large scale production of Tissue culture seedlings of these economically important bamboo species.

Impetus to grow economically important bamboo plantations departmentally

More impetus should be given to grow successful departmental bamboo plantations of economically important species in forest areas. Area of non-muli bamboo plantations raised in forest land during the last five years is only 10.45% of the total bamboo plantations created in the state. Almost 90% of the plantations are of Muli bamboo only.

Raising of bamboo plantations with TC plantlets

Bamboo plantations with TC plantlets have already been raised successfully in Tripura (eg. *Asper* plantation near Parathia central nursery, Udaipur). It is a well known fact that plantations of TC origin takes more time to establish unlike the rhizome plantations. It is just because the TC seedlings take time to develop rhizomes. Rhizome development in TC

seedlings will take at-least two years. But once rhizomes are formed, and then the growth and productivity of plantations of TC origin will be as good as the plantations of rhizome origin. The same holds good for plantations of seed origin too.

Protection of Muli natural regeneration areas

Though Muli used to comprise of about 80% of the total bamboo resources of the state before the species started its gregarious flowering in 2003, its present proportion to the total bamboo resources of the state is not known, as no proper study is available over the percentage of Muli-flowered area where the species has actually regenerated and covered. However, it's mandatory now to take stringent protection measures over the entire area where Muli bamboo is naturally regenerating.

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Chapter 06

Recommendations

1. Policy Issues
2. Bamboo resource survey
3. Bamboo resource augmentation
    a. Selection of species
    b. Raising of nursery
    c. Raising of plantations

1. Policy issues

1.1. Bamboo products excluding agarbhatti sticks including the *role-bhattis* should be exempted from realisation of government royalty, VAT, etc

1.2. Carrying of bamboo handicrafts and agarbhatti sticks within the state should be exempted from transit rules.

1.3. Export of raw bamboo outside the state should be banned.

1.4. Forest Development Agencies should take the lead role in co-ordinating awareness creation, capacity building, value addition and also marketing of bamboo based products within the jurisdictions of the respective forest divisions.

1.5. The entire revenue accrued from the harvest of JFM project areas should go to the Revolving fund of the concerned JFMCs.

1.6. Bamboo cultivation, harvesting, value addition and marketing may be looked after by a newly constituted "Tripura Bamboo Development Agency (TBDA)"

1.7. Cultivation and harvesting aspects of bamboo may be dealt by a separate wing created under TFDPC Ltd. And its value addition and marketing aspects may be dealt by a state level "Special Purpose Vehicle (SPV)".

2. **Bamboo resource survey**

2.1. As per the resource survey conducted by Forest Department, Tripura in 1995 the total area under various bamboos in the state is 2397km^2 and out of which almost 80% has been estimated as Muli bamboo. However, it may be noted that the entire muli bamboo population has flowered between 2003 to 2009. Hence, it's mandatory now to estimate the area over which Muli bamboo has successfully regenerated to know the actual resource base of the species.

2.2. The natural resource availability of non-muli species should also be conducted by adopting suitable methodology.

2.3. Study on consumption (species-wise external as well as internal) patterns of various bamboo species and also their annual quantity consumption should be assessed immediately and once in five years after that to make use of the findings in policy decision making in bamboo plantation sector in the state.

3. Bamboo resource augmentation

3.1. Selection of species

3.1.1. *B.tulda* (Mritinga), *B.pallida* (Makal), *B.cacherensis* (Bom/ Betua), *B.polymorpha* (Paura), *B.longispathus* (Rupai), *D.asper* (Asper), *S.dollua* (Dolu), *Thyrostachys oliveri (*Kanak kaich), *B.balcooa* (Barak) and *B.vulgaris* (Bari) are the 10 (ten) species identified as economically important non-muli bamboo species. Their importance has also been prioritized and percentage requirement of every bamboo species has also been given in the *chapter 04*.

3.1.2. While taking up bamboo plantations these species also, the presence/ absence of natural population of various bamboo species in the locality and also the local community needs are to be borne in mind.

3.2. Raising of planting stock

3.2.1. Collection of bamboo rhizomes

Scientific collection of rhizomes is essential. Rhizomes are to be collected soon after first shower at the end of April. While collecting the rhizomes care should be taken not to cause any damage to the sprouts/ eye of the rhizome. Ideally rhizomes from one year old culms are to be collected. Rhizomes are never to be collected from culms older than 2 years. Costs of rhizome are to be notified keeping the market rate of bamboo of a particular species in mind. Collected rhizomes should be kept in transit nursery.

3.2.2 Procurement of TC seedlings

Due to non-availability of bamboo seeds of economically important non-muli bamboo species, tissue culture plants may be procured and mass multiplied by macro-propagation techniques for taking up TC bamboo plantations.

3.3. Raising of permanent and transit nurseries

3.3.1. Permanent nurseries for vegetative propagation of bamboos like *Bari, Barak*, and *Bom* should be a part of all the forest departmental nurseries in the state.

3.3.2. A portion should be dedicated to raise the seedlings of seed origin of *Bom, Makal, Mritinga* and *Dolu* bamboo species which have started gregariously or sporadically flowering in *Cachar* region of Assam and also various parts of Tripura.

3.3.3. The zero age seedlings of *Bom, Makal, Mritinga* and *Dolu* bamboo should be further mass multiplied in nurseries to meet out the local demand.

3.3.4. Special drive for collection of seed and raising of nursery of a particular bamboo species should be arranged by the forest department whenever any of the ten identified species flowers in any part of Tripura or its adjoining states.

3.3.5. It is advisable to keep the bamboo rhizomes in the transit nurseries before planting out in the field after onset of monsoon.

3.3.6. It is also mandatory to inspect the genuineness of rhizomes before planting in the field.

3.3.7. The one year old culm of species like *Bari, Barak* and *Bom* should be utilised for vegetative propagation of the species through branch and culm cuttings.

3.4. Raising of plantations

3.4.1. Pitting for bamboo plantations should be completed by end of March.

3.4.2. Planting should be completed soon after arrival of three good rains after completion of pitting, in case of rhizome plantations. This practice is ideal when the monsoon sets early/ well in time. Because, if there is long dry spell after receipt of summer rains at the end of April and before the onset of monsoon, most of the rhizomes planted in the field will dry due to drought.

3.4.3. In case of delay in monsoon, the rhizomes can better be stored in a transit nursery and the planting can be completed soon after the onset of monsoon. This practice will ensure 100% survival of planting stock in the field. Damaged rhizomes will dry and die in the nursery bed itself. By doing so, additional expenditure on vacancy filling can also be avoided.

3.4.4. Proper weeding, soil mounding around the base of seedlings/ rhizomes, fencing and maintenance are equally important for success of a bamboo plantation.

Value addition & Marketing

(Part-II)

Chapter 07

Background

Bamboo is the most important Non-Timber Forest Produce (NTFP) used extensively by tribal and rural poor in Tripura and plays an important role in generation of employment and development of rural economy of Tripura. It is estimated that around 6.1 million mandays is generated per annum by way of management, harvesting and utilization of bamboo. And, about 1.49 lakh artisans are engaged in the state in value addition of bamboo, producing annual craft sale of Rs.35.34 crores (TFD, 2001).

Present level of bamboo extraction is about 184 million culms/ annum with utilization in housing, supply to paper mill, handicraft, agricultural implements and other items being about 135, 16.5, 3.2, 1.5, 28 million culms/ annum respectively. Out of 184 million culms / annum bamboo extraction, 110 million culms / annum is recorded removal and 74 million culms / annum is unrecorded removal (TFD, 2001). However, only about 2% of the total extracted bamboo is used for value addition and so the sector has tremendous potential for growth (D K Sharma, 2008).

Considering the average estimated demand of 42.76 numbers of bamboo culms per capita, total demand of bamboo per annum has been projected to be 117.93 million culms in the year 1995, in Tripura (Tangwan, 1995).

Despite largest area under bamboo in the world, share of India in the global market is only 4%, mostly because of low productivity (0.5 MT/Ha/Year), compared to 80% contribution by countries like Japan, China and Malaysia. Though the market potential for the domestic bamboo industry in the country is about Rs. 4500 crores, domestic bamboo economy is only about Rs. 2000 crores. India's share in world bamboo market is expected to increase to about Rs. 22800 crores by the year 2015. Planning Commission of India has given following estimates of the percentage consumption of Bamboo in the country (CBTC, 2008**;** Bhattacharjee and Chakravarthy, 2008).

Table.1. percentage consumption of Bamboo in India

Use	Consumption Percentage	Use	Consumption Percentage
Paper pulp	35	Packing i/c Baskets	5
Housing	20	Transport	1.5
Rural uses	20	Furniture	1
Fuel	8.5	Wood working industries	1
Non-residential	5	Other uses	3

(CBTC, 2008**;** Bhattacharjee and Chakravarthy, 2008)

Planning Commission of India has estimated current and expected size of markets for bamboo products, which is summarized below (CBTC, 2008)

Table.2. Current and expected size of markets for bamboo products in India

Bamboo product/ application	Indian Market in 2001 (Rs. in Crores)	Expected Indian Market by 2015 (Rs. In Crores)
Bamboo Shoot	5	300
Bamboo as Wood Substitute	10000 (Import Value)	30000 (in 20 years)
Bamboo Plywood	200	500
Bamboo Plywood for trucks/ Railways	1000	3400
Bamboo Board and Flooring	100 (Domestic) 100 (Export)	1950
Bamboo Pulp	1000	2088
Bamboo Furniture	380	3265
Bamboo Handicraft	765	1265
Building & Construction Material		
Scaffolding	-	861
Housing	250	1163
Roads	274	1000
Bamboo in Cottage Sector (Agarbatti sticks, Venetian blinds etc.)	Agarbatti Industry Rs.1800 crores, Bamboo cost in this is about Rs. 135 crore	1000
Misc uses (ice cream, fishing rods pencils, matches etc.)	394	600

(CBTC, 2008; Bhattacharjee and Chakravarthy, 2008)

Different sub-sectors

1. STICKS & BLINDS SUB-SECTOR
2. HANDICRAFTS SUB-SECTOR
3. FURNITURE SUB-SECTOR
4. MAT SUB-SECTOR

1. STICKS & BLINDS SUB-SECTOR

Sticks in different sizes and thickness lend themselves to different end products. Incense sticks find their way to most homes for religious or fragrance purposes. Decorative table mats, floor mats and blinds are applications that enjoy good market demand forming part of the soft furnishings industry as described in today's retail parlance.

These sticks have contributed to handicraft products with a good export market utilising traditional designs and patterns. However, a large domestic market that has been available seems to be on a decline with Indian homes adopting a more contemporary look, while these products still stay within the realm of traditional usage/looks. Obviously, this has led to such handicrafts suddenly looking out of place in a modern Indian home

from an urban perspective. Inputs of designers with an understanding of consumer preferences backed by natural eco-friendly platform could turn things around to appeal to the new generation with new found purchasing power.

Consumers are looking for new colours, material combinations and different looking products. With increasing competition, the demand for better finishing and workmanship has also emerged. These are being demanded at no extra cost since consumers are not willing to pay more given the fact that the market is flooded with large variety of imported products available at affordable prices. Consumer tastes too have shifted to these new products easily available off retail shelves. This then constitutes the challenge the bamboo sector will have to face up to.

Traditional Indian handicrafts with limited designs and colours find it difficult to compete with such mass produced and different looking products of consistent quality that can be imported quickly in large quantities. Opening up of global borders is contributing to the choice available and with money coming into newer hands the basis of choice itself is undergoing a major change.

Mechanisation of processes while preserving basic sanctity of design is an option that the handicraft industry has begun to consider seriously. For one, mechanised looms for weaving table mats and window blinds out of bamboo have already made their appearance in some parts of the country, yet industry needs to transcend from its handicraft base to address needs of volume and quality.

1.1. Structure of Industry

Blind, incense and fine stick based mat making industries are currently in the unorganised sector. These are small cottage industries supplying to larger exporters and soft furnishing outlets through local agents or buying houses. Purbasha, the state managed handicraft marketing arm has played a major role in the past to be the vital link between producers and market.

1.2. Market Opportunities for Tripura

There are five following opportunities for Tripura in the context of stick products.

1. Manufacturing hub for incense sticks and finished incense products
2. Supply of readymade bamboo sticks to mechanised looms making blinds
3. Supply of finished fine stick mats for homes
4. Supply of slats for flooring units established
5. As supplier of graded & quality certified intermediate material for applications

1.2.1. Incense sticks and Finished incense products

Tripura sticks meet up to 60% of the market needs. Though the agarbatti industry enjoys a handsome growth rate of 10-12% per annum in the last 5 years the economic condition of the agarbatti bamboo stick maker in Tripura remains unchanged due to the poor return he gets for making the sticks.

The agarbatti industry is a fragmented one with numerous small players dominating the industrial landscape. The biggest brand in the agarbatti industry Cycle, has only 3% market share. The industry is still largely concentrated (almost 80%) in the Southern region. ITC has now entered the industry as a national player, buying from vendors who make handmade products.

The value of the industry is estimated at Rs. 4,000 Crore according to the All India Agarbatti Association. Out of this, 20% is the premium agarbatti segment while remaining 80% is the regular agarbatti. It is important to understand this distinction because quality of sticks used in both segments is different. The premium agarbatti segment uses Shimoga bamboo (*Dendrocalamus giganteus*) sticks till date – these sticks are said to be smoother, thicker and not easy to bend. On the other hand, the regular segment uses the "Assam Stick" which is of inferior quality as compared to Shimoga stick since it is thinner and tends to bend at the time of rolling.

25-30% of the industry is controlled by 20-25 large players with the turnover of each player being Rs. 25-30 Crore approximately. The largest player, Cycle has a turnover of Rs. 450 Crore with 75% of the industry being characterised by small players who undertake even perfume dipping and packaging through job workers supplying to Distributors.

The agarbatti industry is characterised by a long supply chain from stick maker to final consumer. The industry prefers to outsource most activities firstly because the process is highly specialised, and secondly because aggregation of workers in an industrial environment may lead to formation of labour unions.

The industry consumes three types of raw material prior to fragrance dipping and packing stages – bamboo stick, jigat and charcoal. After rolling, the main ingredient required is the perfume which is the most expensive part of the agarbatti with industry sourcing these on its own. For other raw materials, it has another fixed set of traders with whom it deals on a regular basis.

1.2.1. a. Baseline assessment of agarbatti industry in Tripura - employment, volume & turnover

The cost of Bamboo being procured is as below with the artisans depending on the local market for bamboo and bringing them either by cycles or on their shoulders thereby incurring no transportation cost:

Particulars	*Price in Rs. (per pc.)*
Bari (30-35ft, 12-13kg.)	30-40/-
Mritinga (25ft, 8.5-9kg.)	15-20/-

Generally, two types of agarbatti sticks having thickness 1.2mm & 2.2mm are made. The length varies from 8" to 10''.
1kg. of 1.2mm bamboo sticks of 8'' length contains around 5,000 sticks.

1 person working 8 hrs a day can make 10 kgs. of sticks of 8'' having 1.2 mm dia. However considering the marginal nature of the activity very few are able to devote that kind of time to the activity. From each family on an average 3 members are involved with making sticks. However, women in the household do not work for more than 3-4 hours per day on an average making 5 kg of sticks per day per person.

1.2.1. b. Strengths and Weaknesses (SWOT)

Though employment levels in the industry are high, turnover levels are low. It may be a better idea to focus on productivity to increase incomes rather than look to adding higher numbers of employability. An assessment of strengths and weaknesses of agarbatti stick industry in Tripura is presented below:

STRENGTHS	WEAKNESSES
Availability of abundant raw material **A**vailability of local skill for making bamboo sticks **T**rade relations already with end user industry **N**o alternate source likely to be available for end user industry for a long time to come.	**I**ndustry in the clutches of a few traders **B**argaining Power of the lowest constituent – the bamboo stick maker is low. **L**ack of entrepreneurial talent to drive a local industry
OPPORTUNITIES	**THREATS**
Improvement in existing system through decreasing number of intermediaries **I**ntroduction of mechanization to increase the productivity per household **I**ntroduction of value addition in the industry through rolling	**D**ifficult to penetrate/bypass the existing system of traders and create confidence in a new system **T**raining on machine operation and stick rolling is a thankless job requiring patience on the side of the trainer – also training hours need to be compensated to encourage villagers to offer themselves for training in the first place – Work culture is rather demotivating in Tripura.

1.2.2. Readymade Bamboo Sticks to Mechanised Looms for Blinds

A market seems to be developing for sticks to be utilised for manufacturing blinds of widths varying from 3' to 6' woven through mechanised looms. These looms are currently available in China and can produce roughly 1,200 sq. ft. of woven blinds a day. Other than aspect of higher production, the looms help meet market need for quality and consistency that a discerning buyer would expect while furnishing their tasteful living room.

At present there are two industries with mechanised looms viz., Vighnaraj Blinds and Rhino Industries, which are in the process of being set up in Guwahati and can source sticks from Tripura.

Considering the low investment going into such a unit and the abundant supply of sticks that can be generated within Tripura there is every reason that such units can be established in Tripura in the near future.

1.2.2.a. Current Activity of Stick and Blind Manufacturing in Tripura

All over the state various crafts persons can be seen involved with making of sticks for blinds, place mats , etc. The level of mechanisation is very low with most involved pursuing the manual route. Given the shift in consumer tastes and corresponding production processes the need for raw material also is undergoing shifts. There is an increasing preference for machine made sticks from their shape (round or square) perspective as also uniformity.

Stick Production

Sticks of thickness 1.5 mm & 2.5 mm are produced. Mostly orders are for sticks of size 6'' to 16'' of both 1.5 mm & 2.5 mm, which are then used to make agarbatti for export.

1.2.3. Finished table mats and floor mats

Fine stick mats are fast moving items in all types of furnishing stores catering to popular or premium category customers. Stores generally have a merchandising team that does the selection after 2-3 rounds of design approval and price negotiations. With the visibility and numbers of retail stores in the organised format on an increase they require variety in terms of products to fill their shelves with. This is the opportunity which Tripura can pursue offering contemporary designs using traditional or mechanised techniques.

PRODUCT RANGE

1. Natural fibre shopping bags and baskets.
2. Natural fibre place mats, runners and accessories such as bread baskets, cutlery tray, fruit basket, etc.
3. Natural fibre laundry and storage baskets, bins and boxes.
4. Natural fibre floor mats.

These products can be divided into collections for the dining table and kitchen, for living room, bathroom, desk, and so on. The following is a brief classification of products in each category:

- **Dining Table**: rectangular table mats, round table mats, table runners, food/ cheese covers, fruit trays, glass holders, vegetable baskets, cutlery trays, serving trays, appetizer trays, wine bottle holders and bread baskets

- **Desk**: file holders, pen stands, pen trays, file trays, CD boxes, waste baskets, storage boxes and pen pouches

- **Living room**: magazine racks, wood/ cat/ dog baskets, storage/dust bins, laundry bins, floor mats, foam cushions and door mats

- **Bathroom** (plastic woven): laundry bins, dust bins, bathroom mats, cosmetic boxes, lined pouches and bathing scrubs.

A model on the lines of product portfolio of Industree can be considered for development of fine stick category products from Tripura.

1.2.4. Fine Stick Mat Making In Tripura

This is an area that offers opportunity to employ a large number of artisans given the fact that the products have a good acceptance in the market, are acknowledged as Tripura produce and can not be produced using machines. It will be important though to improve value on the product and raise the value realised for artisans involved. Many groups have been formed involved with such activity.

1.2.5. Slats for flooring units established

Bamboo Flooring represents the higher end of the strip based application. There are two flooring units that have been successfully established and are running at 20-40% capacity at present. These are large units with an investment upwards of Rs 2 crore in plant and machinery. Marketing of bamboo flooring tiles does not seem to be a problem as there is substantial demand which is coming from architects directly and feeding needs of the booming construction and interiors industry.

2. HANDICRAFTS SUB-SECTOR

India is an important supplier of handicrafts to the world market. The industry provides employment to over six million artisans, which includes a large number of women and others belonging to weaker sections of society. In addition to the high potential for employment the sector is economically important from the point of low capital investment, high ratio of value addition, and high potential for export and foreign exchange earnings

for the country. It also allows women to participate in their free time using tools they can well manage leading to supplemental income.

India accounts for only 2% of world trade in handicrafts. China has cornered 17% of world trade in the same sector through aggressive marketing and state assistance to the sector. They have also wholeheartedly embraced mechanisation where required and have realised the importance to compete effectively. Much of the work processes are mechanised to remove drudgery through small machines and appropriate technology and producers as well as officials supporting them are expected to ruthlessly gear themselves for rapid, low cost and efficient delivery.

The handicraft industry in Tripura represents the state of the Indian handicraft industry at large – much talent, workers, and ability but lacking the drive to meet needs of the market and grow. It is sustenance driven rather than growth driven. Many interventions like providing training and facilities have not resulted in giving the desired impetus to the industry mainly due to lack of sustained marketing efforts and low process efficiencies.

Handicrafts are generally classified into two categories:

1. Articles of everyday use or utility handicrafts
2. Decorative items

The application of industrialised process by using mechanisation where possible, organising the suppliers and making products that can be mass marketed in the new "lifestyle" market could serve to change the industry from its present diffused state to a strong product focused state. Articles of everyday use or utility handicrafts lending themselves to this kind of process also need to fit with "lifestyle" needs.
Tripura with a variety of utility handicrafts like baskets, hangers, and screens of various designs can venture into the market by organising the local community to function as a creative unit making products beyond the scale at which they are operating currently.

2.1. Size of Handicraft Industry

According to the National Census of Handicrafts, undertaken by the National Council for Applied Economic Research the value of handicrafts produced in year 1995-96 was Rs. 26,213 crore. According to the census, total number of units producing handicrafts was 12.66 lakhs, employing 41 lakh artisans with average size of a unit being 3.24 persons per unit.

The largest export market for Indian handicrafts is the United States. The Indian handicraft sector is showing an annual average growth rate of 8.5%. In US$ terms also this annual average growth rate is approximately around 4.74%.

2.2. Growth of the Industry

In the changing world scenario, craft products exported to various countries form a part of lifestyle products in international market. The impact is due to changing consumer taste

and trends. Though the industry has recorded a healthy growth rate of 8.5% in year 2005, yet there exists ample scope to improve this further.

In view of this, it is high time that the Indian handicraft industry went into aspects of contemporary and changing designs, patterns, product development, improved production facilities for a variety of materials, technology, and related expertise to achieve faster growth by being competitive with other countries.

2.3. Organised vs. Unorganised

The Indian handicrafts industry is highly labour intensive home based industry. It is decentralised and spread all over the country in rural and urban areas. Consolidation of industry into a creatively managed work force is one of the major challenges for the growth and sustainability of the industry.

2.4. Basis of current volume, turnover and employment numbers

Based on discussions had with Purbasha officials in Agartala an estimated 2,000 SHGs are operating in Tripura making all kinds of handicrafts. Altogether 20,000 artisans are involved and a turnover of Rs 1,500 lakh is estimated to be generated yearly.

2.5. Strengths and Weaknesses (SWOT)

Though local talent is available for making handicrafts yet they are not able to market their products – Rs 15 crore is negligible compared to the total estimated market of over Rs 26213 crore at an all India level. New markets need to be explored through new channels, the traditional channels in the unorganised sector consisting of agents and traders needs to give way to an organised system of dealing with focus of fewer products.

STRENGTHS	WEAKNESSES
Availability of local skills for making utility handicrafts **R**aw material availability	**D**irect exposure to markets is limited **I**ndustry more of daily wage and piece driven than scale driven **S**ize of the units currently operational very small **P**roduct designs not contemporary in look
OPPORTUNITIES	**THREATS**
Lifestyle industry is favourably disposed towards utility handicrafts **T**he new generation consumer and retail formats may provide a good visibility platform for bamboo handicrafts	**U**tility handicrafts made from other natural fibres like palm leaves etc. Are already available in lifestyle stores, for a lay consumer it is difficult to make out the difference between palm, bamboo or any other fibre. **I**mported utility handicrafts from Thailand, Malaysia and China made from bamboo are available in market

3. FURNITURE SUB-SECTOR

The Indian furniture industry has woken up to interesting times and is coming of age. The last ten years have seen changes in the shop windows of furniture retailers with imported furniture flooding the markets and spoiling the Indian consumer for choice.

With the growth in the economy demand is following for new houses and offices and lifestyle products such as furniture. An analysis of demand drivers for the furniture sector is presented below.

3.1. Drivers for Demand in Furniture Sector

3.1.1. Urbanisation

3.1.2. More Population Growth in Metros

3.1.3. Growth in Personal Disposable Incomes

3.1.4. Availability of Housing Finance

3.2. Opportunity for Bamboo Pole Furniture

The multifaceted opportunity in the furniture industry has accommodated in its wake a vast variety of furniture types – from imported to traditional, to the opulent and ostentatious depending on individual taste and preferences. Tripura with its vast bamboo resources and availability of skilled manpower in handling bamboo and making articles and furniture out of the same is well placed to explore the opportunity for the products that can be manufactured to consumer tastes. The target segment and fit for its furniture products needs to be identified and presented with a value proposition that is attractive and sustainable. An assessment of total market size and different segments within this market has been undertaken to identify the most attractive proposition for bamboo pole furniture which can be made in Tripura.

3.3. Structure of Industry

The furniture industry in India is vast with each geographical region has its own typical style of furniture making. Urban India with its newly designed flats and smaller homes has given rise to a newer furniture designs that is more compact and straight as compared to the carving and elaborate furniture designs that were popular few years ago. This can also be attributed to European styling that they are being increasingly being exposed to.

The range of indigenous furniture available in India includes both ready made and contract system furniture, with an increased concentration in office and kitchen furniture. In the area of decorative residential furniture, India has a heritage of exquisite handcrafted furniture, made out of teak, rosewood and walnut wood, emerging from strong colonial roots.

3.4. Size of the Furniture Industry

The total size of the Indian furniture industry is estimated by industry experts to be worth approximately Rs 350 billion, with an estimated 85% of this falling into the unorganized sector. The share of wooden furniture market is estimated at Rs 600 million.

3.5. Organised vs. Unorganised

The furniture industry in India is largely unorganised with only 20 per cent products forming part of the organised sector.

3.6. Supply Chain Mechanism – Elements in Supply Chain

Supply chains in the furniture industry are short with not much value addition being carried out at stages involved. Currently in India, Indian manufacturers use a three-tier selling and distribution structure, this is: distributor, wholesaler and retailer. Margins at each stage are 25-30%, ie. from distributor to wholesaler and wholesaler to retailer. As indicated earlier, there is no value addition taking place as the furniture moves from manufacturer to retailer.
However, the organised retail boom in the country has led to new retailing formats making their appearance in the furniture market too.

3.7. Basis of current volume, turnover and employment numbers

As can be seen from the working of units of Tripura, each furniture manufacturing unit has a turnover of approximately Rs 10-15 lakhs annually. The bamboo furniture manufacturing units have been set up only recently and have a turnover of not more than Rs 2.5 lakhs per unit.

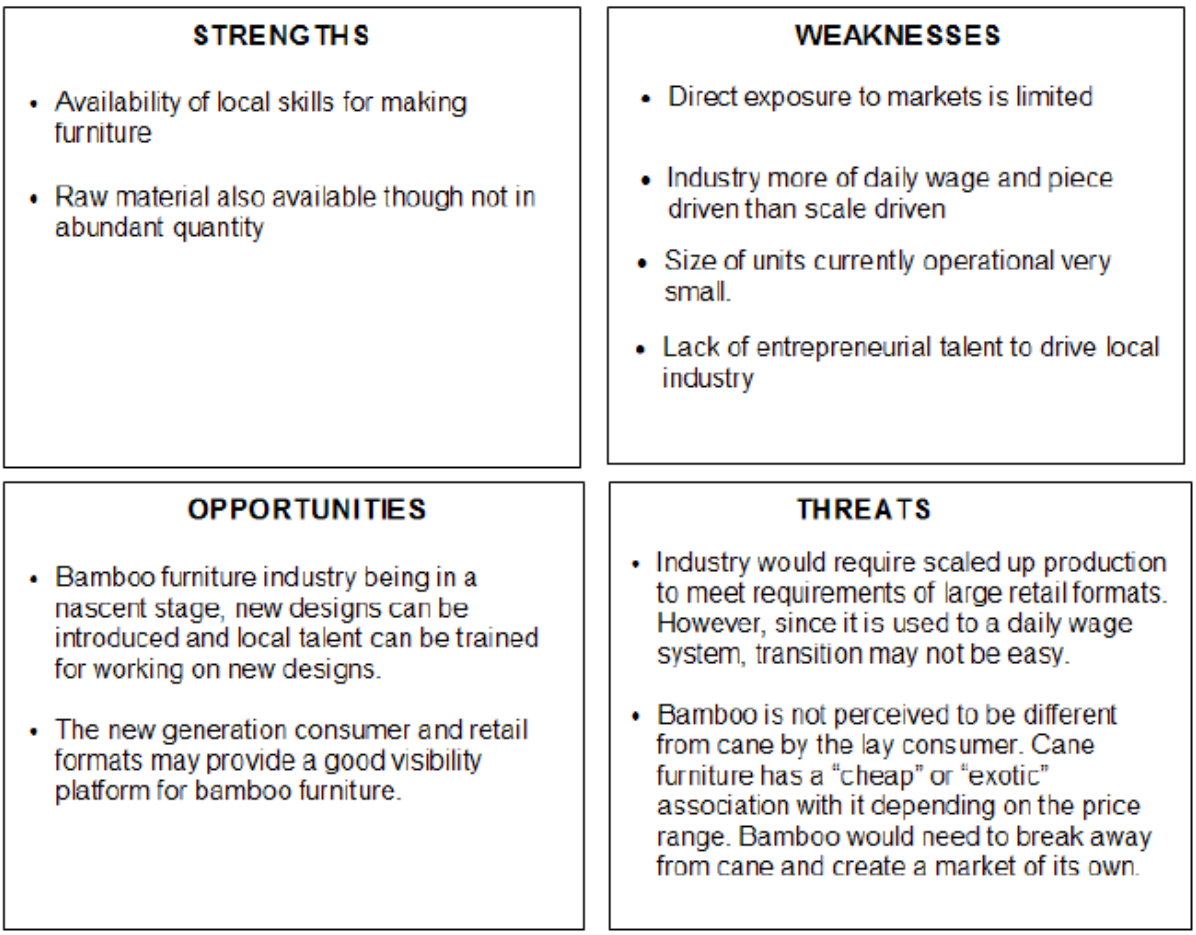
Type of furniture	Number of units	Avg. Annual Turnover (Rs)
Cane	20*	10 lakhs
Bamboo	4	2.5 lakhs

The total turnover of 20 cane units is Rs 2 crore annually while that of a bamboo furniture units is Rs 10 lakh. Looking to market demand the following could emerge as the proposed scale of the sub-sector:

Type of furniture	Number employees/unit	Total People Engaged
Cane	30-40*	600-800
Bamboo	6-7	25-30

It can be estimated that 1000 families approximately are engaged in the production of furniture.

3.8. Strengths and Weaknesses (SWOT)



Though local talent is available for making furniture, they are largely supplying to State owned Purbasha. Nearly 60% of sales of units are currently to Purbasha directly as mentioned by Dhar Industries during our visit. The direct exposure to markets is limited at present. However, since the bamboo furniture industry is at a nascent stage currently, there exists an opportunity to mould it as per market needs though design intervention and market linkages will be required to make them competitive and help build volumes.

4. MAT SUB-SECTOR

Mats are a useful intermediate product made at the primary processing stage and finds large scale utilisation for production of mat board, shuttering board and roofing sheets.

Innovative products like pre-fab houses and pallets to package and export tea have also been designed using mat boards. The market has responded well to these industrial products and there is a good demand for these products emerging from the disaster struck areas like tsunami and earthquake. Bamboo Mat Board has been awarded an ISI code now which has increased its market acceptability particularly in disaster rehabilitation applications. Industries are waking up to these opportunities with newer units planned to be set up in the Eastern region and Southern region of the country. Kitply a one time

market leader is increasingly looking to utilisation of bamboo by introducing new product ranges.

Other than being an intermediary product for board manufacture as indicated above, mats can be used as a floor covering or wall cladding for partitions or to meet aesthetic needs. The ever growing furniture market is always in need of new designs and new materials. Being a decorative item however, variance in design will be required to get over consumer boredom or fatigue factor. Many a times in the past, interior designers interviewed have indicated that they can't use the material extensively given consumer needs for something new. This end of the market whether as a stand alone mat or through the form of boards will thus be constrained by its variety of look in years to come.

Units involved with manufacturing bamboo mat board, bamboo mat corrugated sheets, and prefab houses have been set up in the last 3 years in different states of NER and West Bengal.

4.1. Structure of Industry

A typical board manufacturing unit, roofing sheet unit or prefab house making unit requires an investment in the range of Rs. 1-3 crore on plant and machinery. Entrepreneurs who have traditionally been in the ply board industry or manufacturers of items which lend themselves to usage of bamboo board like prefab houses or railway cabins or even home grown entrepreneurs in NER who know the region and the resource well have entered the business. The units as mentioned above are concentrated geographically in the NER or in the state of West Bengal currently. Another unit is coming up in the state of Karnataka.

Name of Unit	Products Manufactured
AB Composites*	Bamboo mat corrugated sheets
Embee Forest Products	Shuttering board
Kitply Industries	Bamboo decorative mat board, shuttering board
APIL	Prefab houses, boards, pallets
Timpack	Bamboo mat corrugated sheets
Meghalaya Boards	Mat board
Zonun Matply Pvt. Ltd.	Mat board

** AB Composites utilises jute as a composite material with bamboo*
^ Embee Forest Products uses wood with bamboo in its products

4.2. Opportunities for Tripura

The industries are being run by technocrats who know their product and technology and who are equally strong in their marketing acumen.

Units have overcome process teething problems and are prepared to go in for full fledged production. Mat weaving however seems to be the ruling constraint at this point of time. At present they are making do with in house production by either making own mats and strips housing mat weavers or sourcing through traders. However, this is not sufficient – shortage of woven mats is the biggest barrier to the growth of the industry and presents itself as an opportunity should cost and quality needs be met.

Industry owners have indicated that on many an occasion suppliers have failed to deliver on their promises to the market and if they do not soon get a steady supply of mats, it could threaten operations. This will obviously reflect poorly on the so called huge potential identified for bamboo sector with capitalised investment seen.

Although these units had evaluated the availability of mats and developed supply sources yet experience with vendors developed has been far from satisfactory. There have been issues with both, quantity as well as quality of supplies. Past efforts with local communities have not resulted in delivery of required quantities on time. Many of them have spent extensive time even in Tripura to develop stable mechanisms of supply, but to no avail.

It is more important to understand the apprehensions expressed by many large buyers on Tripura being able to deliver on promises made. The units met with were also keen to collaborate in the effort if a new institutional mechanism could be put on the ground that could take a single point onus on discussion and delivery. When probed, some even indicated keenness to collaborate by establishing units in Tripura if a package can be offered to neutralise the cost disadvantage in operation and/or transportation terms. Any new supply based arrangement will have to take into account past failures and suggest a commitment mechanism executed through contracts with non-performance penalties put down as an important clause.

4.3. Employment Opportunity

Mat based board manufacturers have indicated a demand for mats far beyond what Tripura can address at the current point of time. Since Tripura is best suited to produce these mats this can be a great opportunity.

The case for mat making as a sustainable livelihood proposition is possible only if community is able to weave at least 4 mats per day for which they can earn Rs 25/- per mat. To meet this end an aspect considered was that of supply of slivers through a CFC based arrangement taking care of two important aspects at the same time, consistency of quality and availability of raw material. However such a plan will call for an investment of Rs. 25 lakhs+ for equipment alone to establish such a CFC making it unviable to pursue when aspects of cost recovery and capital investment recovery are taken into consideration. Also to be considered is the fact that unless 150-200 workers can get together to work from a location to utilise capacities installed it may not be viable to justify this investment towards operations of Cross Cutting, Splitting and Slivering. Mat weaving of course would n eed to be done manually.

4.4. The Mat Opportunity (Manual)

The community has to step up its productivity from 2 mats to 4 mats/day in order to make the collection process less time consuming and viable. At the same time such a production level will allow the weavers to earn Rs. 90/100 per day for a day's work utilising 8 hours.

Number of mats woven/day	4
Number of mats needed per day	14500
Number of persons which can be employed 14,500/4	3625
The Mat Economy	
Labour charges	Rs 25/mat
Bamboo	Rs 8-9 per mat
Selling Price before transportation	Rs 35/mat
Annual Turnover due to involvement of 3,625 people/day	14500 x 300 days x 35/mat = Rs. 15 crore

There exists immense potential in the mat supply industry which Tripura can tap to create a sustainable supply source. The activity can be stepped up phase wise from year one to year three of the project.

Year	**Number of mats/day**
One	4,000
Two	9,000
Three	15,000

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Chapter 08

Formation of Tripura Bamboo Mission

Tripura Bamboo Mission started a project in 2007 to develop the bamboo sector in the state in a holistic manner by doubling livelihood involvement and the sector turnover in a span of three years. The mission has a subsector specific focus that includes handicrafts, furniture, incense, sticks & blinds, mat and industrial application of bamboo. The project is being implemented by IL&FS CDI based on a Public Private Partnership Framework.

VISION

TBM will strengthen the bamboo based clusters in the state and build their competitive advantage through an integrated approach of building infrastructure, linking markets and providing technology, skills, design and institutional development.

OBJECTIVE

- Scale up the turnover of the local bamboo sector from Rs. 27.90 crore to 75.85 crore within the 3 years project duration.
- Double livelihood involvement in the Bamboo sector in the state

THE TBM STRATEGY

- Build sustainable bamboo based livelihoods based on a cluster based approach.
- Develop an institutional structure owned and managed by grassroots producers & their federations.
- Build their enterprises based on commercially sustainable business models.
- Provide infrastructure, skill training, design support and direct market linkages.
- Mobilize private investment in the bamboo sector in areas like bamboo composites, mechanized sticks and other industrial products.
- Promote plantation in non-forest areas, private land holdings and homestead plantations

GOVERNANCE STRUCTURE

Governance Structure: The strategy for Tripura bamboo mission is formulated by a mission steering committee (MSC) headed by the Chief Secretary of Tripura, representatives of Government of Tripura, Project Management Agency (ILFS – CDI), important national agencies, experts in the bamboo sector and producers of representatives.

The committee oversees the mission activities and provides the necessary guidance. Three sub committees have been formed under the main committee. Those are as follows:

- State steering committee on plantation sector
- State steering committee on handicrafts sector
- State steering committee on bamboo industrial application sector

To ensure sustainability and improve efficiency of the program, Tripura Bamboo Mission (TBM) is being implemented in a public-private partnership (PPP) mode and ILFS CDI Ltd (Infrastructure Leasing & Financial Services Cluster Development Initiative Ltd) has been identified as the program implementation partner.

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Chapter 09

CONSUMPTION OF BAMBOO RESOURCES IN TRIPURA

No comprehensive study on internal consumption of bamboo has so far been done by any agency in the state. However, statistical records are maintained by Forest department on bamboo sent outside the state in the form of cut piece, umbrella handles, agarbhatti sticks, bamboo mat, and fishing rods (Kanak kaich).

Table 6. Statistics on export of bamboo and bamboo based products from Tripura

Year	Cut piece (MT)	Umbrella handles (No)	Agarbatti (MT)	Kaniakiach (MT)
2005-06	10314	7967200	15932	252
2006-07	13783	6568600	20508	739
2007-08	6470	5083898	22105	1420
2008-09	2886	4631500	25195	60
2009-10	160	3363000	28589	0
Total	33613	27614198	112329	2471

(Statistics of Forest Department, 2010)

Cut piece bamboos are sent to Panchagram paper mills, Karimganj Dt., Assam especially from Northern part of the state. Umbrella handles are also traded outside the state from Northern Tripura. And, Kanak kaich bamboo is exported outside the state for making fishing rods.

Agarbhatti sticks are one of the most popular household income generation activity especially among the forest dependent communities who live in the fringe areas of forests. Tripura contributes to approximately 70% of the total agarbhatti stick production industry of the country. Mritinga and Paura are the two most preferred bamboo species for agarbhatti stick making.

It is noted from the statistical records of the Forest Department that the export of cut piece bamboo (*Figure.7*), umbrella handles (*Figure.8*) and also fishing rods (*Figure.9*) show a decreasing trend in the last three years. However, the quantity of agarbhatti sticks exported outside the state shows increasing trend in the past five years (*Figure.10*).

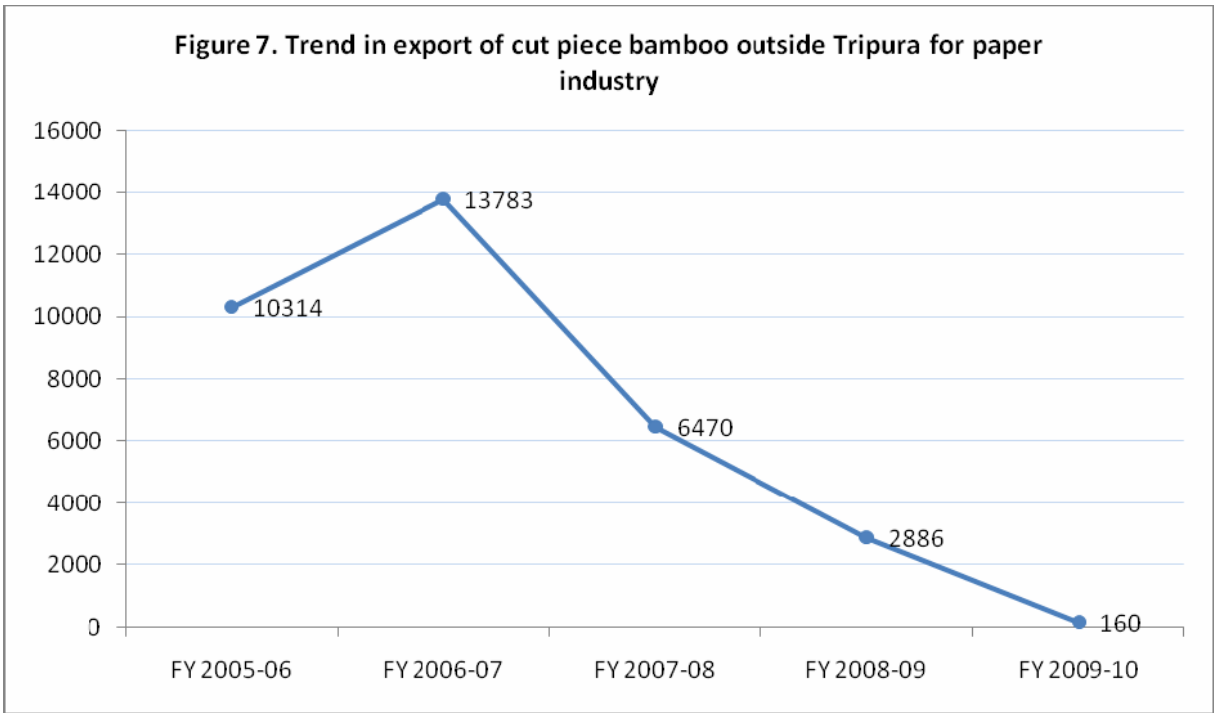


Figure 7. Trend in export of cut piece bamboo outside Tripura for paper industry
16000
14000
12000
10000
8000
6000
4000
2000
0
10314
13783
6470
2886
160
FY 2005-06
FY 2006-07
FY 2007-08
FY 2008-09
FY 2009-10

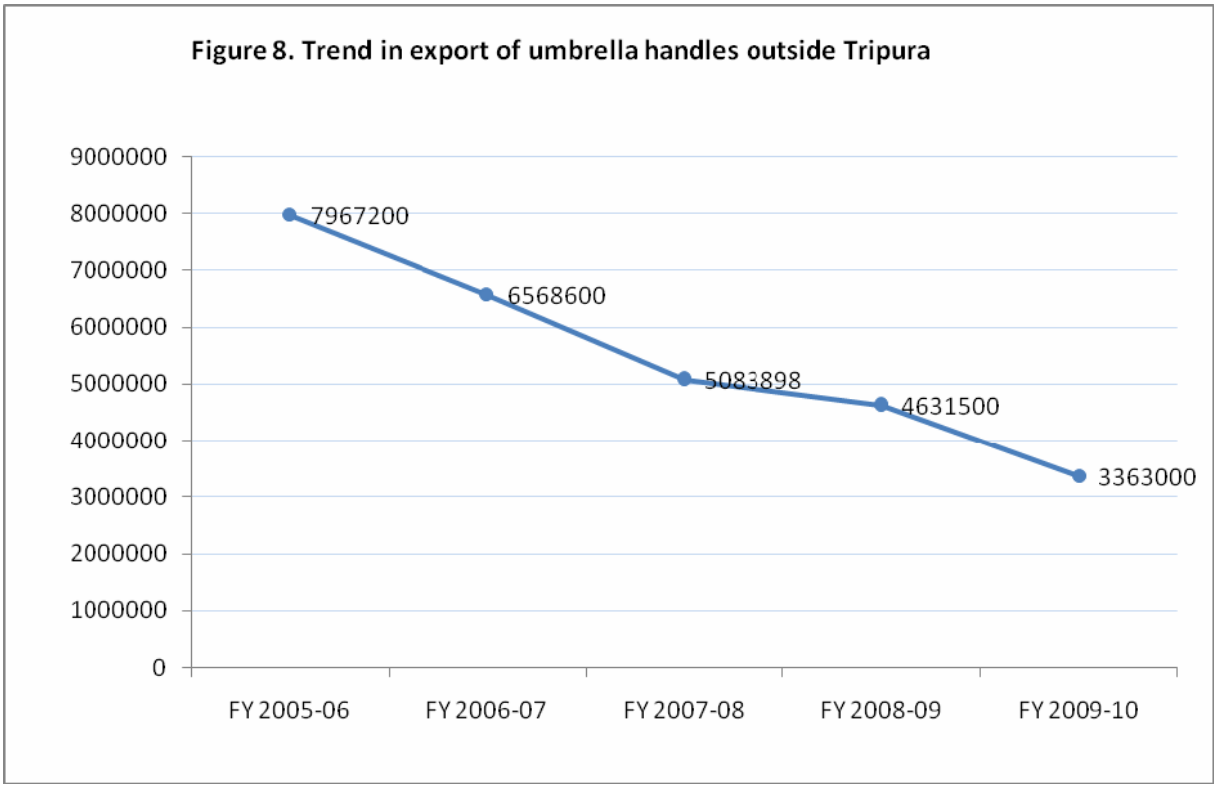


Figure 8. Trend in export of umbrella handles outside Tripura
9000000
8000000
7000000
6000000
5000000
4000000
3000000
2000000
1000000
0
7967200
6568600
5083898
4631500
3363000
FY 2005-06
FY 2006-07
FY 2007-08
FY 2008-09
FY 2009-10

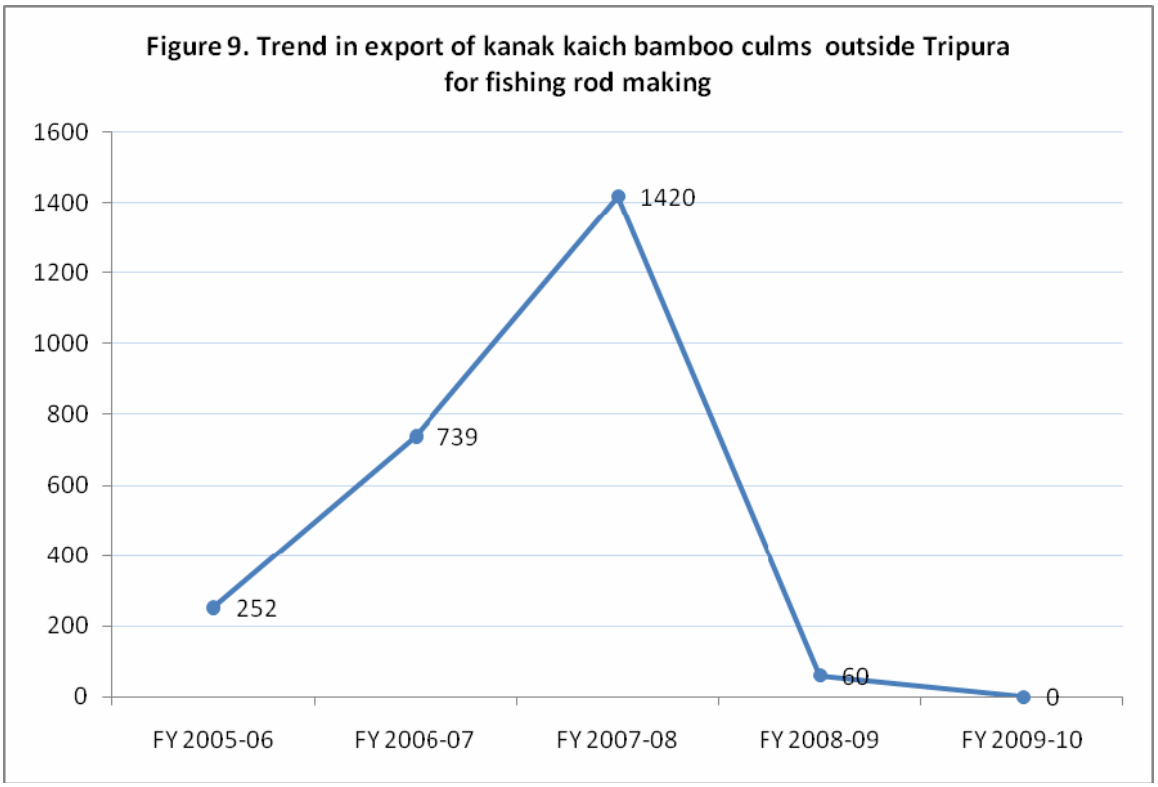


Figure 9. Trend in export of kanak kaich bamboo culms outside Tripura for fishing rod making
1600
1400
1200
1000
800
600
400
200
0
252
739
1420
60
0
FY 2005-06
FY 2006-07
FY 2007-08
FY 2008-09
FY 2009-10

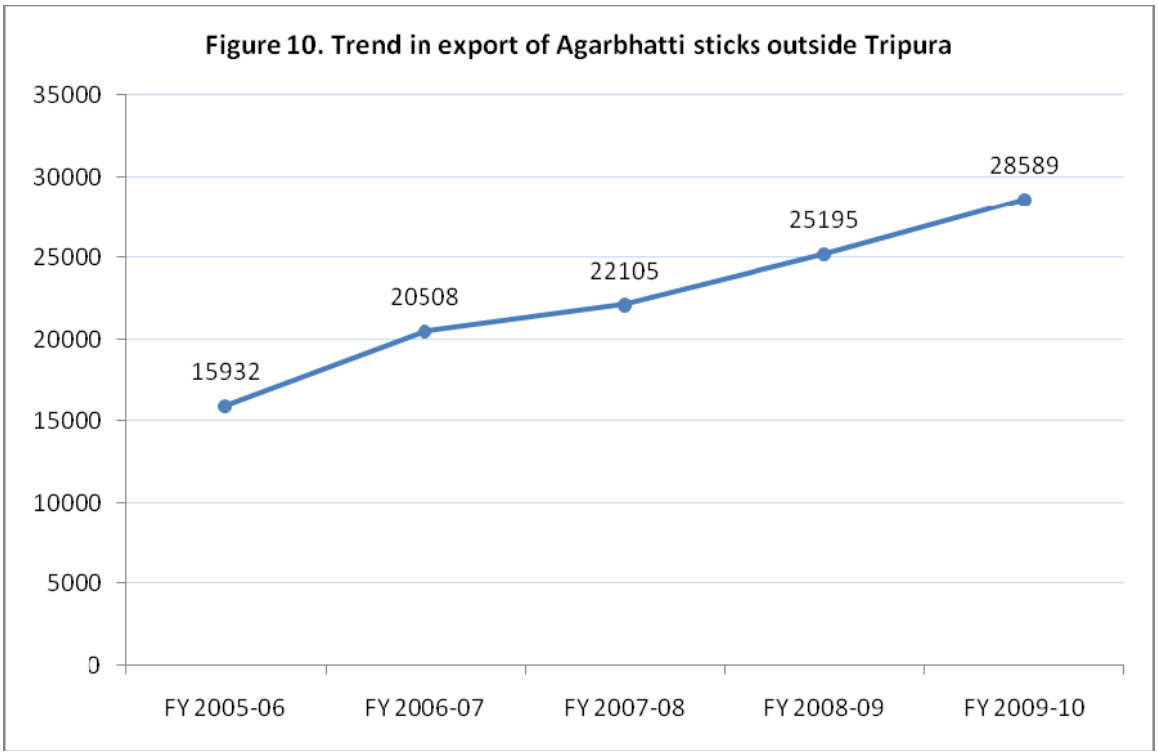


Figure 10. Trend in export of Agarbhatti sticks outside Tripura
35000
30000
25000
20000
15000
10000
5000
0
15932
20508
22105
25195
28589
FY 2005-06
FY 2006-07
FY 2007-08
FY 2008-09
FY 2009-10

The foremost reason for decline in export of cut piece bamboo is because the exhausted natural resource base muli bamboo which gregariously flowered in the state between 2003-2009. Moreover, the local demand for non-muli species has also disproportionately increased as adequate quantity of matured muli bamboo is not available to meet out the local household demand. Non-muli bamboos are being increasingly used for household purpose due to the same reason.

Umbrella handles though showing decreasing trend over the past five years, it is expected to pick up when the area of natural occurrence of muli bamboo is re-stocked through regeneration of muli thorugh natural, aided or artificial means.

Kanak kaich bamboo export in the form of fishing rods is showing sharp decrease in the past three years. But, it is to be noted that more of bamboo based furniture making units has come up in the last three years, due to the initiative taken by Tripura Bamboo Mission. And, no adequate resource base is at present available in the state for meeting out the existing demand of kanak kaich bamboo for furniture and fishing rod making industries.

Tripura Bamboo Mission has since its inception taken initiative to boost the production of agarbhatti sticks in the state. Thus, the increasing trend in export of agarbhatti sticks is easily attributable to the initiatives taken up by the mission.

Table.7. Monthly statistics on agarbhatti sticks exported outside Tripura

2006-07		
Sl. No.	***Month***	***Agarbatti sticks, MT***
1	APRIL '06	1132.50
2	MAY '06	1501.50
3	JUNE '06	1380.00
4	JULY '06	2247.50
5	AUGUST '06	2863.50
6	SEPTEMBER '06	2029.50
7	OCTOBER '06	1740.00
8	NOVEMBER '06	1763.00
9	DECEMBER '06	1122.00
10	JANUARY '07	1374.50
11	FEBRUARY '07	1580.00
12	MARCH '07	1774.00
	TOTAL	**20508.00**

2007-08		
Sl. No.	***Month***	***Agarbatti sticks, MT***
1	APRIL '07	2150.50
2	MAY '07	1904.50
3	JUNE '07	1505.50
4	JULY '07	1641.00
5	AUGUST '07	1376.50
6	SEPTEMBER '07	1402.00
7	OCTOBER '07	2779.00
8	NOVEMBER '07	2296.00
9	DECEMBER '07	1873.50
10	JANUARY '08	1710.50
11	FEBRUARY '08	1224.50
12	MARCH-'08	2242.00
	TOTAL	**22105.50**

2008-09		
Sl. No.	***Month***	***Agarbatti sticks, MT***
1	APRIL '08	2476.50
2	MAY '08	2080.00
3	JUNE '08	1873.00
4	JULY '08	1992.00
5	AUGUST '08	1741.00
6	SEPTEMBER '08	2008.50
7	OCTOBER '08	1624.00
8	NOVEMBER '08	1938.00
9	DECEMBER '08	1561.00
10	JANUARY '09	2016.00
11	FEBRUARY '09	2392.00
12	MARCH '09	3493.00
	TOTAL	**25195.00**

2009-10		
Sl. No.	***Month***	***Agarbatti sticks, MT***
1	APRIL '09	3189.50
2	MAY '09	2798.50
3	JUNE '09	2444.00
4	JULY '09	1974.00
5	AUGUST '09	2284.00
6	SEPTEMBER '09	1987.00
7	OCTOBER '09	2114.00
8	NOVEMBER '09	2425.00
9	DECEMBER '09	2254.00
10	JANUARY '10	2335.00
11	FEBRUARY '10	2255.00
12	MARCH '10	2529.00
	TOTAL	**28589.00**

(Statistics of Forest epartment, 2010)

Revenue from the royalty of bamboo (TFD, 2007) (FD,2010)

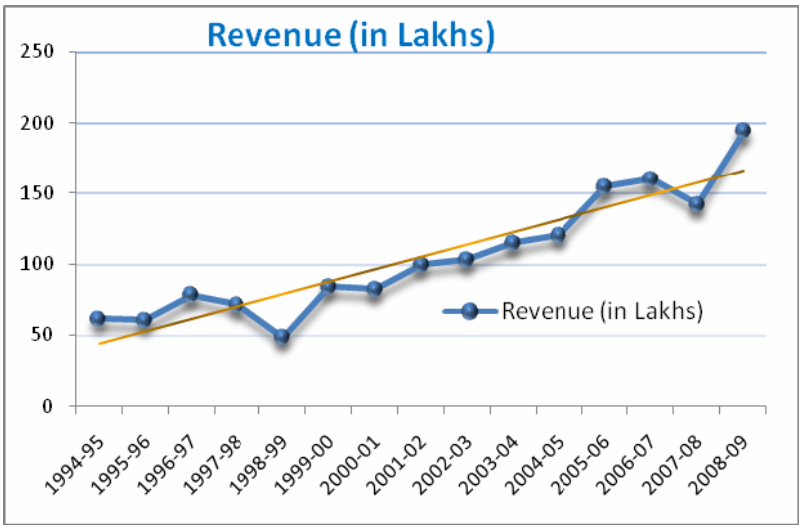
Bamboo is the top-most revenue generating Non-Timber Forest Produce (NTFP) in the state. It is also the most important NTFP in terms of generating livelihood income to the forest dependent communities of the state.

Especially in last five years an encouraging trend in revenue generated to the government by export of bamboo and bamboo based products could be noted from the *Table.6* and *Figure .12.*

Table.8. Revenue generated by sale of bamboo and bamboo based products

Financial Year	Revenue (in Lakhs)
1994-95	61.77
1995-96	60.53
1996-97	78.38
1997-98	71.39
1998-99	49.07
1999-00	84.12
2000-01	82.29
2001-02	99.87
2002-03	103.06
2003-04	114.64
2004-05	120.65
2005-06	154.6
2006-07	160.15
2007-08	142.14
2008-09	194.28

Figure.12. Trend in revenue generation by sale of bamboo and bamboo based products



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Chapter 10

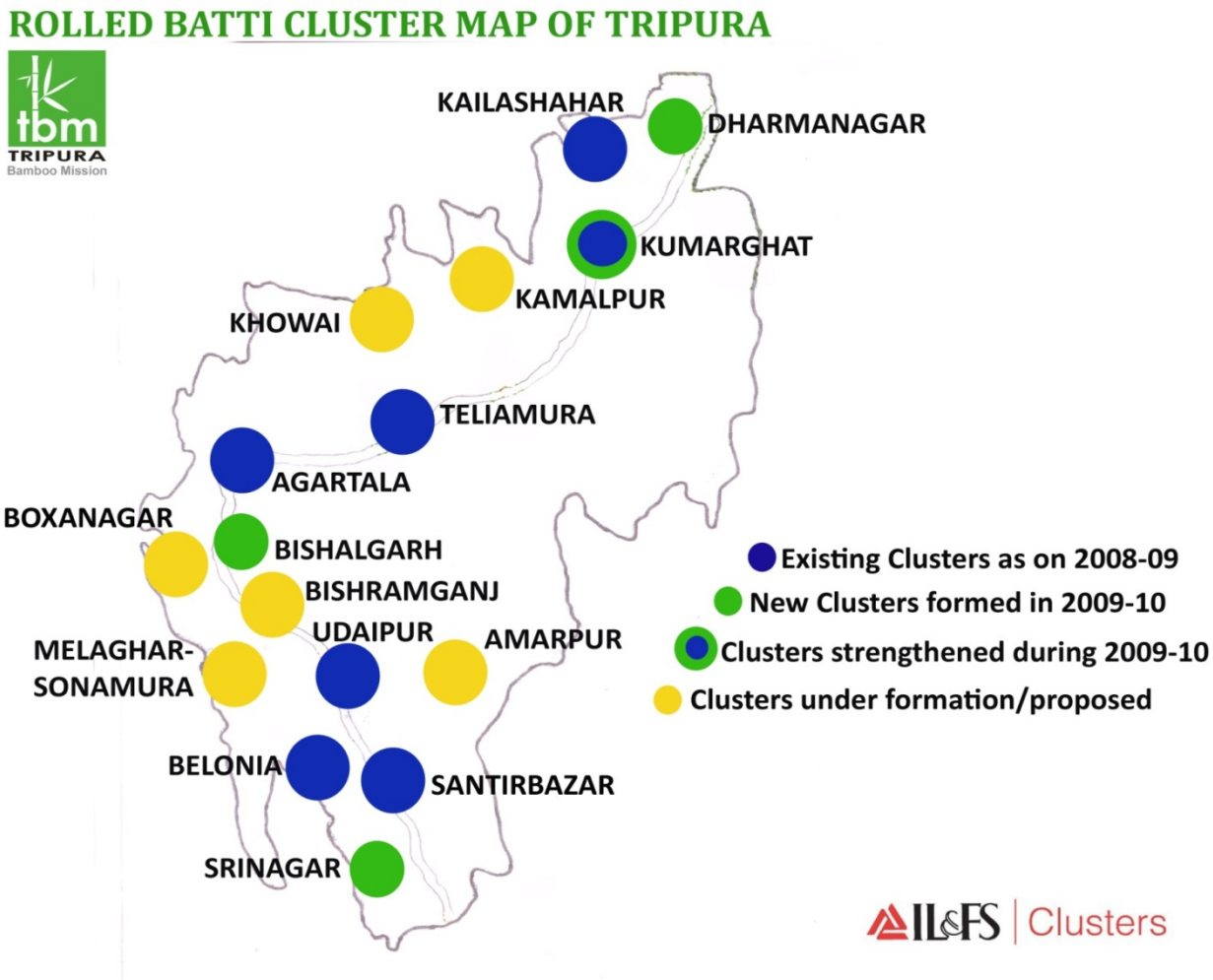
Intervention and Current activities of TBM

1. PROGRESS ACHIEVED IN AGARBHATTI SUB-SECTOR

Community Mobilization for Formation of rolling clusters:

Cluster based approach is followed by TBM to mobilize the community and development of the sector. The methodology involves working at the grass root level, to mobilize community, building their capacity by extensive training, providing market linkages for the trained community, monitoring & motivating, supporting both the producer as well as buyer groups ultimately to result in a sustainably run rolled agarbatti cluster. Community Mobilization, thus, is an integral part of the strategy of cluster development. Meetings with the women interested in rolled batti activity are held, ideas are shared with them about opportunities in this sector. Local government bodies like Panchayets are also made aware of the scope in Agarbatti. The team from TBM identifies a venue for organizing a 5-day long training and fixes date and time. The interested women are requested to be present at the venue on specified date and time.

RAW AGARBATTI (ROLLED BATTI) CLUSTERS IN TRIPURA



Objective

TBM has the objective of achieving conversion of 10% of the sticks produced from Tripura into polished sticks and raw agarbattis.

Key Activities undertaken

- Introduction of rolling of incense in the state.
- Formation of rolling centres/clusters.
- Capacity building of the mobilized community.
- Establishing market linkages.
- Strengthening the supply chain.

Progress made

- Total No. of women trained in incense rolling in FY 2009-10 : 1068
- No. of rolled batti centres established as during 2009-10 : 10
- No. of Rolled Batti Clusters formed/Strengthened : 4
- Total Production of rolled incense in 2008-09 : 1000 MT
- Total production of rolled incense in 2009-10 : 900 MT
- Total sales of rolled incense in 2008-09 : Rs 4.00 crores.
- Total sales of rolled incense in the state 2009-10 : Rs. 3.87 Crores.

Capacity building of the rolling community

The mobilized community is trained by professional & experienced trainers on hand-rolling of agarbatti sticks. Generally, five days skill training is conducted for the women to train them in Agarbatti rolling. In this training focus is given towards-

- Proper mixing of Jiggat and charcoal.
- Importance of maintaining proper ratio of the various ingredients.
- Proper method of production
- How to minimize wastage
- Quality control in production with the aspects like tip length, tip diameter, exposed bamboo, split bamboo, smooth finishing, straightness, moisture content, counting per kg etc.

The training program is followed by a production supervision program to build the skill levels and the production capacity of the trained rollers as well as centre manager.

Training of women in Agarbatti Rolling by Master Trainer

A rolled batti centre specific centre manager/resource person is identified and is trained to manage activity in the respective cluster. The resource person is trained on the following aspects: aspects of quality & timely delivery ensure adherence to quality specifications, traceability and timely delivery by introducing systems, sorting, weighing, packaging, quality checks and batch coding to stock maintenance and payment.

Market Linkage

Market linkage is the most critical requirement for the sustainability of the rolling clusters. In view of this TBM has partnered with various outside-state as well as local entrepreneurs and linked them directly to the rolling groups in the clusters.

TBM continuously handholds and monitors production activity in the incense rolling clusters. Local resource persons are identified and supported by TBM. Infrastructural support like pulverizer machine, weighing machine, warehouses is provided. Moreover, to increase productivity of individual rollers, TBM gives incentives like rolling desks to potential high productive rollers. TBM has also facilitated insurance for women agarbatti rollers under Rajiv Gandhi Shilpi Swasthya Bima Yojana.

Strengthening the Supply Chain

TBM continuously handholds and monitors production activity in the incense rolling clusters. Local resource persons are identified and supported by TBM. Infrastructural support like pulverizer machine, weighing machine, warehouses is provided. Moreover, to increase productivity of individual rollers, TBM gives incentives like rolling desks to potential high productive rollers. TBM has also facilitated insurance for women agarbatti rollers under Rajiv Gandhi Shilpi Swasthya Bima Yojana.

The critical link in the supply chain is the sustainable supply of raw material for rolling of incense. The rolling activity in the state is undertaken in close partnership with the Forest Department and the JFMC members. The JFMC members who are authorized to harvest the *Jiget* bark are organized to collect jiget and charcoal and pulverize it for the production of masala.

Agarbatti Powder being despatched to a centre from

Income generation in the sector

- Income/earnings from unpolished stick making : Rs. 12-13/ kg **(incl. cost of bamboo)**
- Net Earnings/ month from raw stick making: Rs 500-700 per month.
- Income/earnings from agarbatti rolling : Rs. 12 -15 per kg **(excl. raw material)**
- Net Earnings from rolled batti making :Rs 900 – 1300 per month

Value addition in the sector:

- Production of rolled agarbatti in FY2009-10 : 900 MT
- Value of rolled battis in theFY2009-10 @ Rs 43 / Kg : Rs. 3.87 Crore
- Volume of sticks converted to rolled battis (35%) : 315 MT
- Cost of the 315 MT sticks@ say Rs. 14/kg : Rs. 44 lakhs

Incremental Value Creation by introducing rolling of incense is Rs. 3.43 Crore

- Volume of rolled batti converted into perfumed stick FY2009-10: 415 MT
- Cost of 415 MT of perfumed stick @ Rs. 160/kg : Rs. 6.64 Crore
- Cost of 415 MT raw agarbatti@ say Rs. 43/kg : Rs. 1.78 Crore

Incremental Value Creation by Perfumed Incense stick is Rs. 4.86 Crore

Polished Sticks

Polished Stick activity in the state

Key Activities undertaken:

1. Introduction of polished sticks in the state.
2. Mobilizing the community to undertake production of polished bamboo sticks
3. Training to the producers on making polished bamboo stick
4. Institution Building by federating the small traders/ produces into cooperative mode
5. Capacity building of the cooperative society
6. Technology Induction in Bamboo Stick making
7. Establishing market linkages

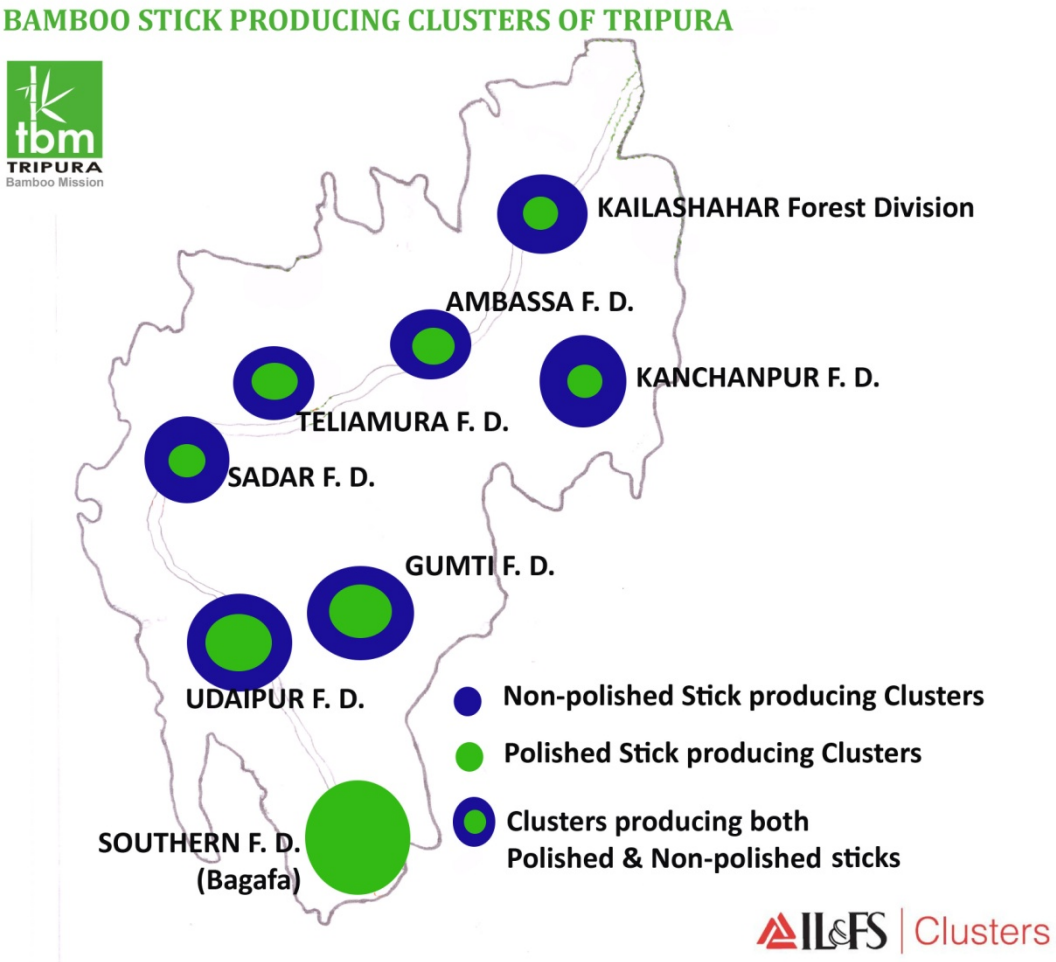
Progress Achieved:

- Total No. of members trained in making polished stick(Agarbatti) : 679
- No. of cooperative society formed in 2009-10 : 2
- Total Production of polished sticks in 2008-09 : 3429 MT
- Total production of polished sticks in 2009 – 2010 : 5717 MT
- Total Turnover of polished sticks in 2008 – 2098 Crores. : Rs 7.20

- Total sales of polished sticks in the state 2009 – 2010 Crores. : Rs. 13.72

- Earnings from polished stick making 1200 per month : Rs 900 –

Bamboo Stick Producing Clusters of Tripura



Introduction of Polished Stick

The polished sticks used in the incense industry were mostly imported from Vietnam and China. At the onset of the TBM implementation, the IL&FS CDI team had collected samples of the imported sticks from the buyers from the Bangalore during 2008-09 and did a

Polishing techniqu
convert non-polish

thorough analysis of the product specifications and costs. This product with an increasing demand was replicated in south Tripura with the support of the DFO Bugafa division, South Tripura. TBM has promoted awareness about high value added Polished Stick products. 2 more Cooperatives were formed during 2009-10 by federating small traders of bamboo stick. Started with Bagafa Forest Division, now the trend of converting low value non-polished sticks into high value polished sticks is already setting in other forest divisions like Udaipur, Ambassa, Sadar, Teliamura etc.

Tripura is emerging as a major hub of Polished Bamboo Stick in the South East Asian region.

Community Mobilization & Capacity building

In partnership with the Forest Department and the producers/primary traders of sticks, 679 stick makers (women artisans) were trained in the production of polished sticks. Trainings were conducted to achieve the industry requirement count of 4000 – 4500 sticks per kg, polish the sticks manually to make it completely fibreless and also restrict the green content to less than 1%. The trainings were immediately followed with the income opportunity of earning upto Rs 18 per kg with a linkage with the local entrepreneur.

Women engaged in Polished stick making in a centre

Technology Induction in Polished Stick Making

TBM has introduced semi mechanization in Polished Stick making in various pockets of the state. In traditional method, the artisans collect bamboo and cross cut them manually to get cylinders of 8" or 9" before finally drawing out sticks. This process consumes a major part artisans' total work hour of the day resulting in low yield. Also due to manual processing the length of the cross cuts do not meet the stringent specifications, thereby, degrading the quality of finished products.

With introduction of electric run automatic machines designed especially for cross cutting bamboo pole, there has been a significant improvement in the production level and quality of the polished stick. 12 such machines have been provided to SHGs in Bagafa, Udaipur and Ambassa Forest Divisions. The results were remarkable. The productivity individual artisans have also gone up as they now devote their full work hour only on drawing out sticks and Polishing thereafter.

The fully mechanized bamboo polished sticks are also important with respect to bamboo based industrialization in the state. The three ultra-modern fully

mechanized bamboo stick making units are operational. On an average, 6-9 MT of machine made sticks are exported out of Tripura every month.

Institution Development

To consolidate the production of polished sticks it was decided to organize the small aggregators in a forest division to form a cooperative. This was done primarily to build their competitive strength through the aggregation of the production and also enable them to directly access the markets outside the state and thereby maximize their returns and also pass on part of the benefits to the stick makers. Based on the above concept the "Pillak Cooperative" was formed in the Bagafa forest division. 14 small traders who were procuring and selling the stick individually in a very small scale has been organized in to this cooperative society. Regular meetings and training has been conducted to this group on various aspects like cooperative concept, leadership & motivation etc in order to basic business management. After the formation of the society FTL license and CST number has been obtained from the departments for smooth function of the procurement and sales of agarbatti stick. With the success of the Pillak agarbatti co-operative society model, Govt. of Tripura has circulated one order to replicate the same all across the state by the forest department.

Policy related to procurement, pricing and selling of the products is decided by the cooperative board depending on the marketing condition and in consultation with the DFO and the DRDA office leading to transparency in its operations.

Market Linkage

An important factor for the growth of the polished direct market linkage facilitated by TBM with ITC Ltd. The Company is one of the largest manufacturers of incense in the country and has linked the sourcing of polished sticks to various ITC franchisees located in different parts of the country. Linkages have also been forged with various members of the All India Agarbatti Manufacturers association in Bangalore who are directly sourcing sticks from the sticks cooperative. The Cooperative Societies formed during the financial year 2009-10 have been linked to these ultimate buyers of polished stick.

Production of mechanized bamboo stick

Detailed Estimate of Turnover of the Incense Sector in Tripura since the inception of the Tripura Bamboo

Mission

The Incense Sector comprises of the following:

- Raw non-polished Sticks
- Polished Sticks
- Rolled sticks (raw agarbatti)
- Perfumed Incense Stick

Traditionally Tripura has been the largest producer and supplier of raw / unpolished sticks in the Country. Under the TBM project the primary objective has been to convert 10% of the sticks produced from Tripura into polished sticks and rolled battis (next levels of value addition).

During the past three years of implementation, TBM has undertaken a series of interventions ranging from training, capacity building, promotion of local enterprises, institution development, technology induction and enabling market linkages to instrument the shift from un-polished sticks to polished sticks making and raw incense making in the state. The turnover of the Incense sector is estimated by data compiled from the following sources:

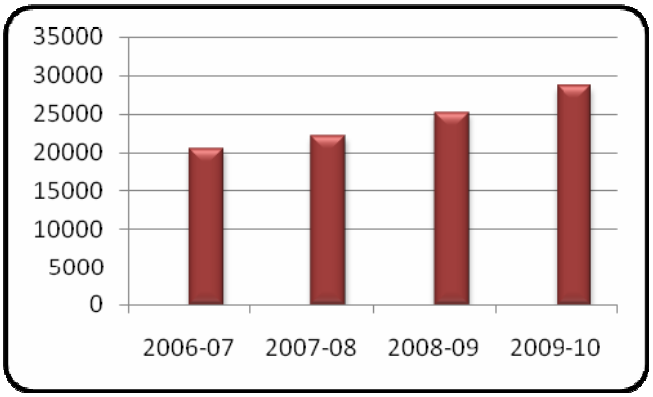
- Information on sticks despatched from the Chuaribari Forest Beat office at the Churaibari check gate in North Tripura which is the only transit gate for goods traded outside the state.
- Information on volume of polished sticks traded in Bagafa Forest Division from the DFO office Bagafa.
- Information on the business volumes reported by the major local entrepreneurs in the state in the case of raw batti.
- The detailed break-up of the business undertaken in the incense sector in the state is given below with the assumption that during FY 2009-10, Avg. price of Polished stick-Rs. 24/kg; Avg. price of Non-polished bamboo stick-Rs.14/kg; Avg. price of raw agarbatti-Rs. 43/kg.

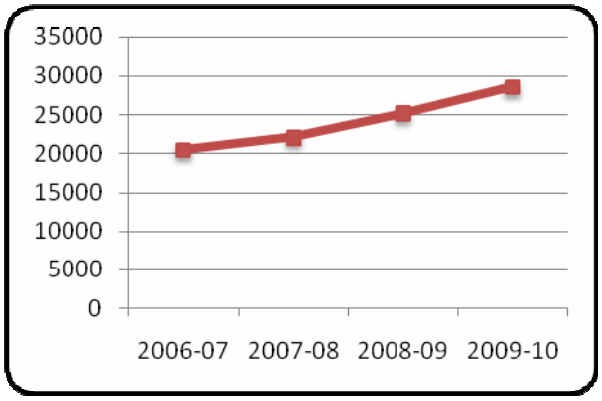
Year	Total Unpolished Bamboo Sticks		Total Polished Bamboo Sticks		Total Raw Agarbatti		Perfumed Batti (Finished Incense stick product)	
	Volume (MT)	Value (Rs Crore)	Volume (MT)	Value (Rs Crore)	Volume (MT)	Value (Rs Crore)	Volume (MT)	Value (Rs. Crore)
2006-07	20441	12.26	67	0.10	-	-	-	-

2007-08	21190	14.83	1216	2.07	300	1.02	-	-
2008-09	20474	24.57	3429	7.20	1000	4.00	-	-
2009-10	22871	32.02	5717	13.72	900	3.87	415	6.64

Total volume of Bamboo Stick exported from Tripura

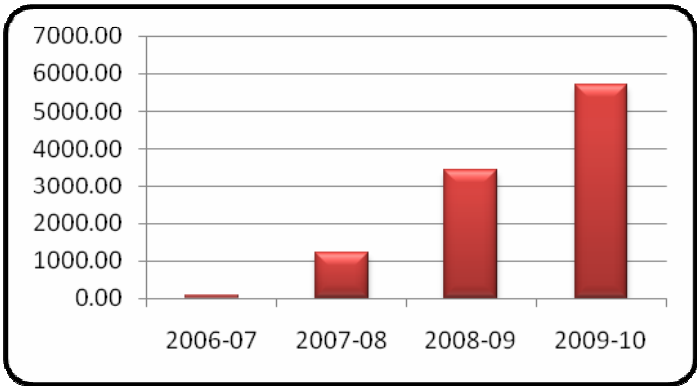
F. Y.	*MT Exported*	*% Growth*	*% Cumulative Growth*
2006-07	20508.00	-	-
2007-08	22105.50	7.79	7.79
2008-09	25195.00	13.98	22.85
2009-10	28589.00	13.47	39.40





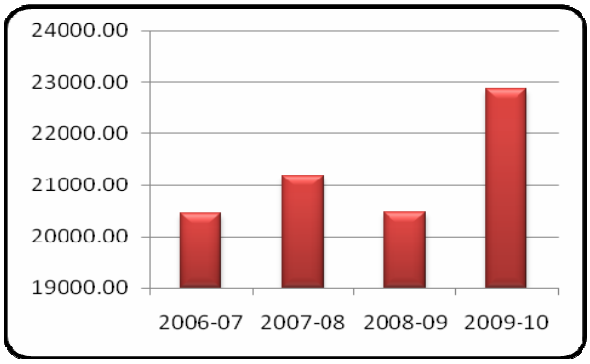
Total volume of Polished Sticks supplied from Tripura

F. Y.	Production, MT
2006-07	67.00
2007-08	1216.00
2008-09	3429.00
2009-10	5717.00



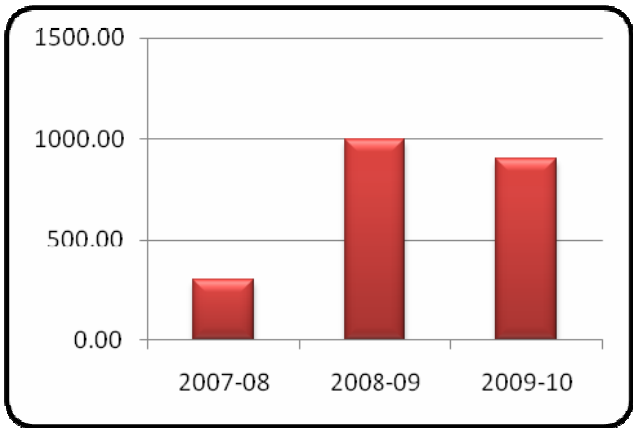
Total volume of unpolished incense Sticks supplied from Tripura

F. Y.	Production, MT
2006-07	20441.00
2007-08	21190.00
2008-09	20474.00
2009-10	22872.00



Total volume of Rolled batti (raw agarbatti) supplied from Tripura

F. Y.	Production, MT
2007-08	300.00
2008-09	1000.00
2009-10	900.00



Over the period from 2007– 2010 the incense sectors have witnessed the following developments:

- The export of bamboo sticks (both polished & non polished) increased cumulatively by 39.40% from 2007 to 2010.
- Production of raw agarbatti was steady despite irregular supply of raw materials.
- The gradual decline on the pre-dominance of unpolished sticks
- Establishment of ITC Franchisee operations in the state.
- Local entrepreneurs taking up rolled incense
- Rise in price of the polished sticks and rolled incense caused by demand pull factors and replacing the Vietnam sticks
- Less sharp rise in price of unpolished sticks caused mostly by rise in price of bamboo due to the shortage experienced by the bamboo flowering (supply factor).
- Significant increase in production of perfumed batti in the state.

2. PROGRESS ACHIEVED IN BAMBOO HANDICRAFTS SUBSECTOR

Objective:

The core objective in the handicrafts sector has been to address the limited production capacity and also to make a shift from the traditional designs of handicraft which is faced with a decline in market potential to more contemporary utility products. This would enable the state to increase the value of the sector from 15 crores to 30 crores and also increase the earning potentials of the artisans engaged in handicraft.

Snapshot of various activities in handicraft sector

TBM conducted various Skill & Design Development Training at various clusters and location across the state. The following trainings were conducted at Agartala, Town Pratapgarh, Jogendranagar, Mohanpur, Nagarpara, Katlamara and Nalchar cluster. Design partners for the trainings were AIACA, New Delhi, Hrishikesh & Nandini, New Delhi and NID, Ahmedabad.

- Design Development training for home utility products.
- Training on bamboo treatment and dyeing
- Training on production management.
- Skill and design development training on bamboo furniture
- Training on high end bamboo utility product.

Key Activities undertaken:

- Large scale mobilization and organization of artisans in the leading handicrafts clusters
- Formation of artisan co-operatives
- Skill training of artisans
- Design development and introduction of utility based products
- Infrastructure provisioning (CFCs)
- Technology Induction
- Capacity building of the mobilized community.
- Establishing market linkages.

Progress Achieved:

- Total no. of handicraft clusters mobilized :9
- Total No. of artisans trained in : 2000
- Total No of new product designs introduced : 200
- Total No. Of artisans trained : 1308
- No. of registered artisan cooperative : 8
- Established Market linkages worth Rs 70 lakhs through direct market interventions.
- Total turnover of bamboo handicrafts in 2007 – 2008 : Rs 16.50 Crores.
- Total turnover of bamboo handicrafts in 2008 – 2009 : Rs. 18.97Crores.
- Total turnover of bamboo handicraft in 2009-2010 : Rs 20.56 crores
- Earnings from bamboo handicrafts :Rs 1500 – 3000 per month

Income Generation in the sector:

Handicraft sector is one of the most important incomes generating activity for artisans in the state. Income generated from handicraft varies from craft to craft practised by artisans. Tripura Bamboo Mission's initiative and interventions to develop the handicraft sector in important handicraft cluster has resulted in substantial increase in the income of the artisans.

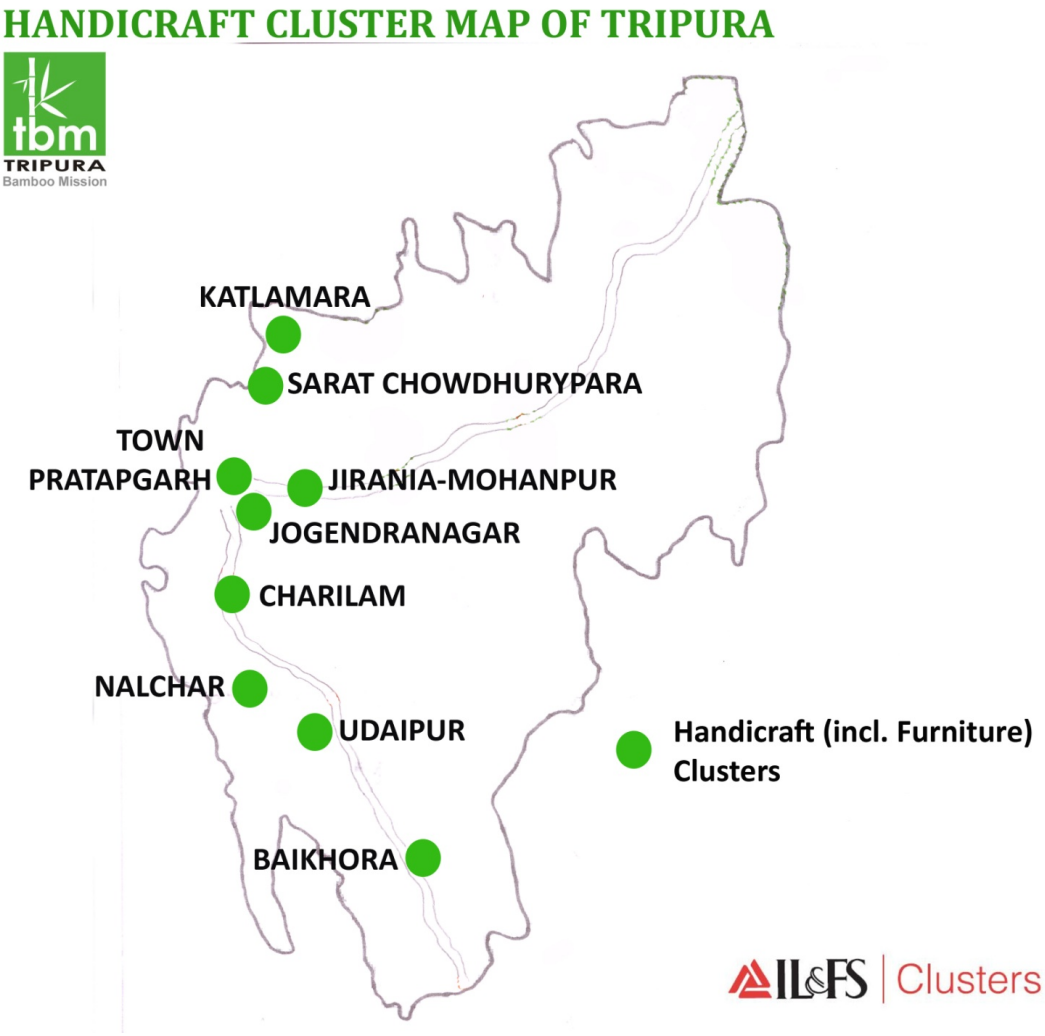
Artisans at Baikhora Cluster in South Tripura one of the most important cluster. The artisans at Baikhora cluster based were organised into a society and trained by Tripura Bamboo Mission in making finished goods and higher value added utility products like hand bags, file folder, training & conference bags, yoga mat and other accessories. The production center was established in May 2008 and at the Baikhora cluster the income of artisans after TBM's intervention has increase from Rs 1200/- to Rs 2500/- per month. The center is functioning independently without any grant funding support from Tripura Bamboo Mission or any other Government sources.

HANDICRAFT SUB-SECTOR CLUSTER

West Tripura: 1 Town Pratapgarh 2. Charilum, 3. Jogendranagar, 4. Jirania, 5. Nalchar & Bagabasa 7. Nagarpara (Sarat Choudhury ADC)

South Tripura: 1. Baikhora 2. Udaipur

Total Artisans covered: 1308



Detailed Estimate of Turnover of Handicrafts Sector in Tripura
FY 07 – 09, FY 08 – 09 and FY 09-10.

Tripura Bamboo Mission has conducted a detail survey of all major handicraft producers and entrepreneurs in the state. The survey was conducted in collaboration with the SPV and it was found that the total turnover in handicraft sector in the financiual year 2009-2010 including the bamboo furniture sector is Rs 20.56 crores.

The details of turnover recorded in the handicraft cluster in the past years is also mentioned below

- Total turnover of bamboo handicrafts in 2007 – 2008 : Rs 16.50 Crores.
- Total turnover of bamboo handicrafts in the state 2008 – 2009 : Rs. 18.97 Crores.
- Total turnover of bamboo handicraft 2009-2010 : Rs 20.56 Crores

3. PROGRESS ACHIEVED IN BAMBOO FURNITURE SECTOR

Objective

To build an exclusive cluster for contemporary bamboo knockdown bamboo furniture using the Kanakaich round poled bamboo.

Design development workshop, Prof. Ranjan & team, NID

Key Activities undertaken:

- Mobilization of artisans in Katlamara and Nagarpara (Sarat Choudhury ADC Village)
- Formation of artisan co-operatives.
- Skill training of artisans.
- Design development and introduction of utility based products.
- Infrastructure provisioning (CFCs).
- Technology Induction.
- Capacity building of the mobilized community.
- Establishing market linkages.

Progress Achieved:

- Total no. of handicraft clusters established: 2
- Total No. of artisans trained in bamboo treatment, dyeing and design development : 150
- No. of registered artisan cooperative : 1
- No. of SHG federation : 1
- Established Market linkages worth Rs 50 lakhs through direct market interventions.
- Design development partnership with National Institute of Design (NID),

4. PROGRESS ACHIEVED IN BAMBOO MAT SUBSECTOR

Objective:

Build the bamboo mat sector in Tripura, through mobilizing private investment, introducing technology, and building a bamboo mat supply chain through a cluster based approach.

Mat (*Dhari*) production activity in the state

Key Activities undertaken:

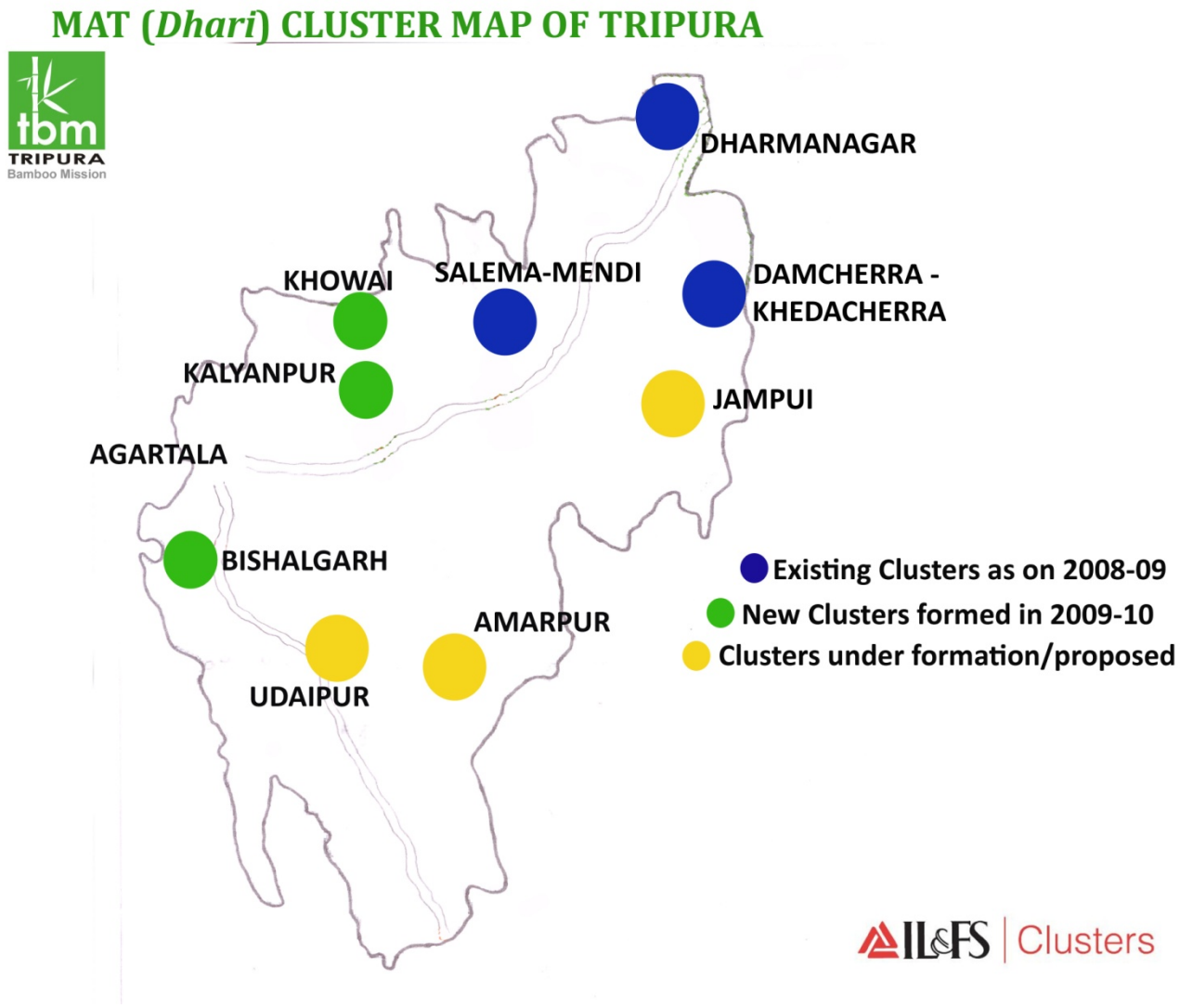
- Introduction of commercial & industrial Mat weaving in the state.
- Community Mobilization & formation of mat weaving clusters.
- Capacity building of the mobilized community.
- Establishing market linkages.
- Strengthening the supply chain.
- Institution Building
- Infrastructure

Progress Achieved:

- Total No. of women trained in mat weaving during FY 2009-10 : 1304
- No. of Mat weaving clusters established during 2009-10 : 3
- Total production of in bamboo mats 2008 – 2009 : 2,00,000 mats
- Total production of in bamboo mats 2009 – 2010 : 2,50,000 mats
- Total turnover of bamboo mats in 2008 – 2009 : Rs 1.57 Crores.
- Total turnover of bamboo mats in the state 2009 – 2010 : Rs. 1.44 Crores.
- Earnings from bamboo mats weaving per month :Rs 1400 – 2000

MAT PRODUCTION CLUSTERS UNDER TBM

1. Damcherra-Khedacherra, North Tripura
2. Dharmanagar, North Tripura
3. Salema-Mendi, Dhalai
4. Kalyanpur, West Tripura
5. Khowai, West Tripura
6. Bishalgarh, West Tripura



Income Generation in the sector

- Earnings per mat
  Industrial mat : Rs 70 per day; daily 2 mats @ Rs. 35 per mat
  Local Commercial grade : Rs 100 per day; daily 5 mats @ Rs. 20 per mat
- Average monthly earnings from Mat weaving activity :Rs 1400 – Rs2000

Value addition in the sector

- Production of bamboo mat in FY 2008 – 2009 : 2,50,000 Mats
- Average Value of bamboo mats @ Rs 57.5 / - mat : Rs. 1.44 Crore
- Volume of bamboo converted to mats : 245000 poles
- Value of bamboo @Rs 20 per pole : Rs. 49 lakhs

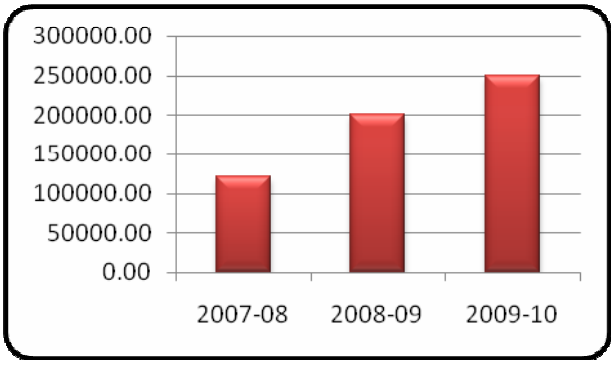
Incremental Value Creation by production of bamboo mats is Rs. 0.95 Crore

Detailed Estimate of Turnover of Bamboo Mats sector Tripura FY 2009-10

The detailed estimate of the total turnover of industrial grade bamboo mats that has been supplied form Tripura is compiled from the total sales undertaken by the P.S Greengold of Dharmanagar, the local private enterprise that has been promoted under the TBM project to aggregate the mats and supply it to the various mat board units located outside the state. The detailed estimate turnover of Local Commercial grade Mat has been taken from the local enterprises/producer groups across various locations of the state.

In the FY 2009 – 2010 the production capacity of mats including industrial as well as Local Commercial grade reached 2,50,000 mats and the total turnover achieved was Rs 1.44 crores as compared to Rs 2,00,000 mat and 1.57 Crore turnover in FY 2008 – 2009. The production increased due to large demand of Local Commercial grade of Dhari. Compared to this, the production of Industrial grade mat was not satisfactory due to unorganized marketing and price mismatch with bamboo board units. Although the turnover has decreased slightly, but by promoting Local grade Dhari, TBM has provided livelihood to a large number of population through Mat (Dhari) weaving.

F. Y.	Production, MT
2007-08	120000.00
2008-09	200000.00
2009-10	250000.00



Total Sector wise Turnover Achieved:

Sector	Strategy	Turnover target		Achievements (Rs. Crores)		
		Baseline	**Project target**	**Year 1**	**Year 2**	**Year 3**
Incense	The project aims at converting 10% of the 20,000 MT of low quality raw sticks to higher value polished sticks and rolled sticks	12.9	30.93	17.92 (3.09* +14.83**) *polished & rolled * raw sticks	35.77 (11.20* +24.47**) *polished & rolled * raw sticks	54.03 (32.02+13.72+3.43+4.86) Non-polished Stick + Polished Stick + Rolled batti + Perfumed Stick
Bamboo Mats	The project aims to re-engineer the traditional bamboo mats woven for domestic roofing and wall cladding to the standard industrial dimension (8ft *4 ft). It also aims at building the supply chain for a steady supply of mats to the various Mat board units.	-	10.5	0.85	1.57	1.44
Handicrafts	To build the institutional capacity, training and introduce new technology, processes, designs and market linkages to build the production capacity and double turnover	15.00	30.00	16.50	18.97	20.56
Furniture	To build the sector through institution building, training, introduction of new knock down designs, new technology, processes and market linkages.	-	3.12	0.12	0.25	
Industrial Applications of Bamboo	To introduce technology applications of bamboo with established commercial feasibility and market potential		1.30			0.96
TOTAL TURNOVER ACHIEVED		**27.90**	**75.85**	**35.39**	**56.56**	**76.99**

Chapter 11

RECOMMENDATIONS

4. Policy Issues
5. Bamboo resource utilisation - Capacity building, Value addition & Marketing

4. Policy issues

4.1. Bamboo products excluding agarbhatti sticks including rolled bhattis should be exempted from realisation of government royalty, VAT, etc

4.2. Carrying of bamboo handicrafts and agarbhatti sticks within the state should be exempted from transit rules.

4.3. Export of raw bamboo outside the state should be banned.

4.4. Forest Development Agencies should take the lead role in co-ordinating awareness creation, capacity building, value addition and also marketing of bamboo based products within the jurisdictions of the respective forest divisions.

4.5. The entire revenue accrued from the harvest of JFM project areas should go to the Revolving fund of the concerned JFMCs.

4.6. The front line staff of forest department and also the members of JFMCs are to be given field training on vegetative propagation of bamboos, maintenance of transit nurseries and cultivation of bamboo.

5. Bamboo resource utilisation - Capacity building and Value addition

5.1. Sticks sector

1. A co-operative society viz., Pillak Agarbhatti Sticks Co-Operative Society has been established under Bagafa Forest Division with the objective of direct market linkage with the outside buyers, to strengthen the bargaining power of artisans so as to fetch better price to the artisans to their products, and also to bring more transparency into the trade. The model, a successful initiative, has also been replicated in Kailashahar and Ambassa forest divisions also. It has to be replicated in other forest divisions also.

2. When such co-operative societies are in place in every forest division, a Special Purpose Vehicle (SPV) can be formed at state level to deal with the marketing aspect of Agarbhatti sticks in the state.

3. Widen the production base of sticks sector by involving more families in more villages in the activity.

4. Diversify stick making and rolling in separate groups.

5. Set up Common Facilities Centres (CFCs) with equipment for cross cutting Bamboos into cylinders and slivering.

6. Ensure adequate supply of raw material to these CFCs.

7. Ensure coordination of activities of CFCs and JFMCs and FDAs.

8. Promote utilizing bamboo waste for charcoal conversion and using it in rolling of sticks.

9. Business planning for each CFC

5.2. Mats sector

1. CFCs should be set up in strategic locations on the lines of CFCs for incense sticks

2. Centralise Bamboo procurement, slivering and marketing through CFCs.

3. CFCs may be set up with public finance and managed through cluster societies / SPVs / Private sector partners with a well laid out business plan.

4. CFCs should source bamboo raw material from open markets and Forest Department's sale outlets set up departmentally or through JFMCs and/or FDAs.

5. Each CFC should have a well laid out business plan giving details of its features, configuration, membership profile, status of raw material linkage and marketing tie ups, annual targets and phased programme with month wise activities.

5.3. Handicrafts sector:

1. Look at options of commercial applications of **Bamboo Handicrafts for packaging,** including domestic utilities like – table mats, venetian blinds, door and window curtains, carpets etc.,

2. Develop plan for rejuvenation of Purbasha.

3. A Special Purpose Vehicle (SPV) has to be established for handicrafts sector also in the state.

4. Organise the traders as Special Purpose Vehicle (SPV) and develop market linkages

5. Develop and promote Brand for products of TBM.

5.4. Industries sector:

1. Organise a consultation meeting with the TIDC, TFDPC Ltd, the relevant Government Departments, leading industrialists of bamboo sector in NER and elsewhere in the country and develop a road map for the further development of the Bamboo sector in the state. The possibility of a PPP model may be explored.
2. Conduct entrepreneurship development programmes (EDP)
3. Promote entrepreneurial mentoring by lead industrialists for setting up industries in Tripura state.
4. Establish a Bamboo Park.

5. The Government of Tripura may consider formulating a scheme to provide various incentives specifically to investors in the bamboo sector for setting up bamboo industrial units. The assistance can be as grant support to the extent of 40% with option to dovetail other schemes of the State / Central Government. In addition tax exemptions, interest subsidies etc may also be extended for period of say 5 years.

5.5. Institutional structure:

1. At the end of the project period the functions of the Tripura Bamboo Mission should be transferred to the proposed Bamboo Development Corporation (BDC).
2. Sector specific SPVs will be formed by federating societies/ SHGs/ JFMs at the CFC level with provision for enabling strategic partnerships with the private sector.
3. Ensure partnerships with TPFDC, TIDC, Purbasha and other Government owned institutions.

6. Project Extension:

Considering the challenges involved in the implementation of the project and also taking into account the progress achieved so far, the report recommends an extension of two years of project duration.

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ABBREVIATIONS		
ADC	-	Autonomous Development Council
ANR	-	Aided Natural Regeneration
AR	-	Artificial Regeneration
BDC	-	Bamboo Development Corporation
CBTC	-	Cane and Bamboo Technology Centre
CBTC	-	Cane and Bamboo Technology Center
CCFC	-	Community Common Facility Centre
CD	-	Compact Disc
CDI	-	Cluster Development Initiative
CFC	-	Common Facility Centre
CSS	-	Centrally Sponsored Scheme
DFO	-	Divisional Forest Officer
EDP	-	Entrepreneurship Development Corporation
EPA	-	Entry Point Activity
FDA	-	Forest Development Agency
FSI	-	Forest Survey of India
FTL	-	Forest Trade License
FY	-	Financial Year
GoI	-	Government of India
Ha	-	Hectare
IL&FS	-	Infrastructure Leasing & Financing Systems
JFM	-	Joint Forest Management
JFMC	-	Joint Forest Management Committee
JICA	-	Japanese International Co-operation Agency
MGFMB	-	Management of Gregarious Flowering of Muli Bamboo
MT	-	Metric Tonnes
NAP	-	National Afforestation Programme
NBM	-	National Bamboo Mission
NCE	-	NTFP Centre of Excellence
NE	-	North East
NID	-	National Institute of Design
NTFP	-	Non-Timber Forest Produce
PPP	-	Public Private Partnership
SPV	-	Special Purpose Vehicle
SWOT	-	Strengths Weaknesses Opportunities & Threats
TBDA	-	Tripura Bamboo Development Agency
TBM	-	Tripura Bamboo Mission
TC	-	Tissue Culture
TFD	-	Tripura Forest Department
TFDPC	-	Tripura Forest Development and Plantation Corporation Ltd
TIDC	-	Tripura Industrial Development Corporation
VAT	-	Value Added Tax
Yr	-	Year

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