STATUS OF BAMBOO SECTOR IN KERALA

Kerala Forest Research Institute

Quantity of bamboo available

In Kerala, bamboo grows in forests and homesteads. Quantity of bamboo available from the forests of Kerala has been estimated recently through remote sensing techniques and field visits (Vijayakumaran Nair *et al*., 2001). The growing stock works out to 2.63 million tonnes. Multi-spectral images from IRS 1C provide sufficient special resolution to identify plant communities. Bamboo is classified into three density categories of high, medium and low (Fig. 1). The quantity of bamboo in each of these density categories is determined through field sampling. Quantity of bamboo, circle and division wise is given in Appendix 1.

A study conducted by Krishankutty (1990) in homesteads projected the stocking of bamboo as 39 million culms (2.5 million tonnes). Even though different species are available like *Bambusa bambos*, *B. vulgaris*, *Dendrocalamus giganteus, D. strictus*, *Thyrsostachys oliveri*, *Ochlandra travancorica*, *O. beddomei,* etc. *B. bambos* is the predominant one.

Species diversity of bamboo in Kerala

Kerala part of the Western Ghats is one of the major diversity centers for bamboo species coming only next to Arunachal Pradesh. So far, 25 species of bamboos under seven genera have been recorded, among which five species

come under the threatened category, four species have been recorded new to Kerala and two species have been newly described (see Appendix 2). This comes to about 24% of the total bamboos distributed in India and 95% of the total species reported from peninsular India (Kumar and Ramesh, 2000). Bamboos occur as an important associate in southern hill tops, tropical evergreen forests, moist teak-bearing forests, dry bamboo breaks and reed breaks. *Bambusa bambos*, *Dendrocalamus strictus*, *Ochlandra travancorica* and *O. scriptoria* are widely distributed throughout the state in their respective habitats. *B. bambos*, the most popular bamboo species seen in Kerala, occurs in the moist deciduous forests having an average rainfall of 1200-2000 mm with a minimum temperature range of 18 to 33°C. *Ochlandra travancorica* is the most important associate of the tropical evergreen forests and attains its best growth in very wet type of evergreen forests. Two species of shrubby bamboo, *Sinarundinaria debilis* and *S. hirsuta* have been located for the first time in the Silent Valley National Park. Seven different species of *Ochlandra* have been reported from Ranni Forest Division of Pathanamthitta District (Appendix 2).

Requirement of bamboo from various sectors

The requirement of bamboo in the state is mainly from five sectors. The details are given in Table 1.

Table 1. Sector-wise use of bamboo

	Sector	Type of bamboo	Uses
1.	Pulp	Reed and bamboo	Paper, rayon
2.	Traditional	Reed	Baskets, mats, handicrafts, winnows, broom sticks.
3.	Household	BambooReed	Poles, tents, houses, scaffolding, agricultural implements, etc.Walls of houses, thatching (leaves), household items.
4.	Export to other states	Bamboo Reed	Farm uses, supports, scaffolding.Baskets, mats.

The Government has a commitment to supply bamboo and reed to various pulp industries and Kerala State Bamboo Corporation (KSBC). The requirement of unorganized traditional sector is projected from the information obtained from Panchayat Registers. There are nearly 40,000 people depending on bamboo whose requirement is estimated as about 3 tonnes per year per person working out to 0.12 million tonnes. A study conducted by Krishnankutty (1998) projected the requirement of bamboo for household and export purposes as 0.104 million tonnes. The total requirement came to about 0.6 million tonnes. The details of requirement are given in Table 2.

Table 2. Demand for bamboo from various sectors (during 1993-'94)

Consuming sectors	Demand(in million tonnes)
Pulp industry	
HNL	0.189
Grasim	0.040
Punalur	0.085
Traditional sector	
KSBC	0.080
Unorganized	0.120
Export (Neighbouring states)	0.037
Household & other uses	0.067
Total	**0.618**

Supply of bamboo and reed

The different routes of supply of bamboo and reed are schematically given in Figure 2. The requirement of bamboo/reed to modern industries as per the commitment of Government is extracted from forests. Contractors of the industries as per the guidelines prescribed and monitored by the Forest Department do the extraction.

Reed cutters of KSBC also selectively extract the quantity of reed allotted to KSBC. The extracted reed goes to various depots of the corporation. The reeds are distributed to the registered weavers and the products are purchased back by the corporation. Also the corporation supplies reed to public through their reed distribution centers.

In Kerala, bamboo is grown in homesteads also. A study conducted in 1993-94 by Krishnankutty (1998) revealed that homesteads produced 0.107 million tonnes of bamboo during the study period. The private depots purchase bamboo from homesteads. There are nearly 30 wholesale bamboo depots in Palakkad district. The basal and top portions and wastes are sold to paper mills and the middle portion is exported to neighbouring states.

From homesteads, bamboo is purchased by farmers and unorganized traditional communities. Recently, Hindustan Newsprint Limited (HNL) has introduced a scheme to purchase bamboo directly from farmers.

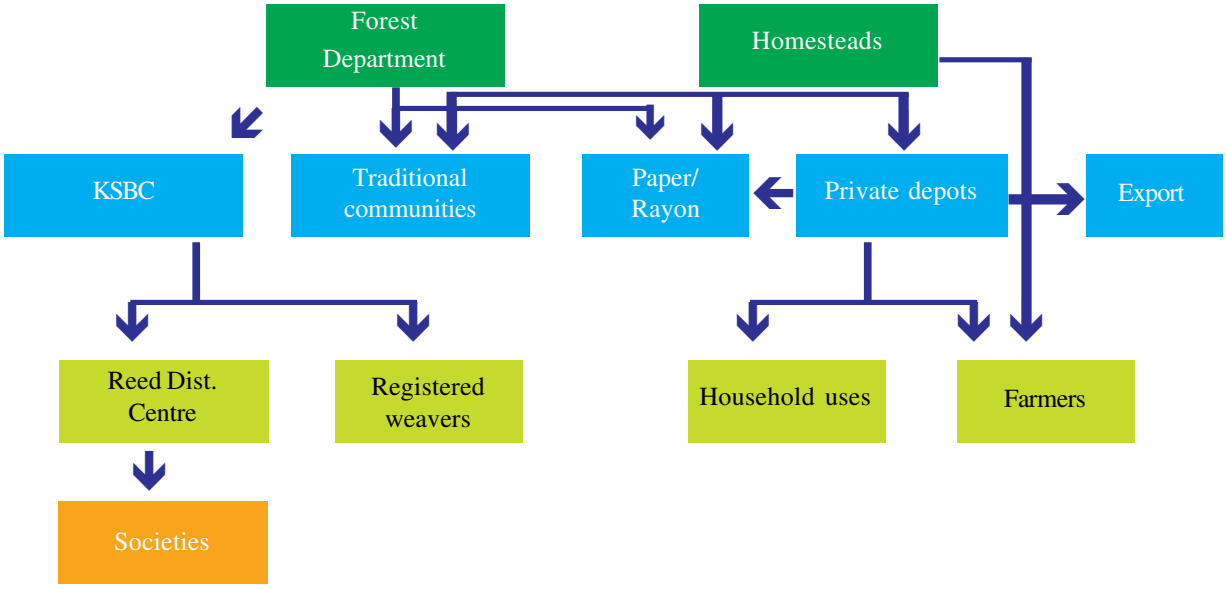

Fig.2. Different routes of supply of bamboo and reed

Table 3 gives information on the quantity of bamboo and reed extracted from the forest areas during 1993 to 2001 and Table 4 provides details on bamboo purchased by HNL during 1998 to 2003.

Table 3. Quantity of bamboo and reed extracted from forests
(in million tonnes)

Year	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01
Bamboo	0.117	0.100	0.084	0.301	0.146	0.132	0.040	0.087
Reed	0.08	0.08	0.05	0.07	0.08	0.09	0.05	0.06

Source –KFD Administrative Reports; KFD Forest Statistics, 1997; 1998; 1999; 2000;2001.

(Converted from numbers to million tonnes using the conversion factor: 16 bamboos = 1 tonne; 720 reeds =1 tonne).

Table 4. Quantity of bamboo purchased by Hindustan Newsprint Limited from Private parties

Year	Quantity (Tonnes)
1998-'99	4250
1999-00	6250
2000-01	13560
2001-02	------
2002-03	11500

Gap between Demand and Supply

To highlight the yawning gap between demand and supply, the statistics available for the year 1993-94 has been made use of.

Forests:	*Bamboo*	*0.117 million tonnes*
	Reed	0.080 million tonnes
Homesteads:	Bamboo	0.107 million tonnes
	Total	**0.304 million tonnes**

The total availability of bamboo and reed from forests and homesteads added to only to 0.304 million tonnes against the requirement of 0.62 million tonnes (see Table 2). This clearly shows that the supply was only about 50%.

Employment

The details of employment in various sectors and the average daily wage earned by bamboo worker are given in Table 5.

Table 5. Employment in various sectors

Sector	No. of workers		No. of working days/year	Average daily wage		Remarks
	Men	Women		Men	Women	
Traditional sector						
KSBC						
Weavers	5000	20000	250-330	35	35	
Cutters	1500	Nil	200	60-75		
Loading and unloading	500	Nil	120	?		
Societies & SSIs	1000		?	?	?	Data not available
Unorganized sector	8000	32000	100-150	25-50	25-35	"
Modern Sector						
HNL	?	?	Minimum Industrial wage			

Agencies connected with various aspects of bamboo

Resources

The Kerala Forest Department (KFD) is the main agency involved in managing the bamboo in natural forests. Also, KFD has made some attempts to establish bamboo plantations. About 2658 ha of bamboo and 525 ha of reed plantations were established up to 1999-2000. Underplanting of bamboo in poor teak plantations and in natural forests was taken up from 1995 onwards and 100 ha were planted under this scheme (Administrative Report 1995-96; 1996-97; Statistics 1997; 1998; 1999; 2000). Besides KFD, the Kerala Forest Development Corporation (KFDC), a subsidiary of KFD, is also involved in raising bamboo plantation. Under National Afforestation and Ecodevelopment scheme, KFDC has raised 760 ha bamboo plantation up to 2001-'02.

Under Kerala Forest Research Institute's (KFRI) initiative, about 1000 farmers have been trained in bamboo farming and many have taken up bamboo farming. More than one lakh seedlings have been distributed to farmers and 12 demonstration plots (a total of about 6 ha) have been established in the farmers' land. During the last three years, Hindustan Newspring Limited has distributed more than 3 lakh seedlings of bamboo and reed to farmers.

Distribution

Kerala Forest Department is the major agency involved in supply of bamboo and reed from forest areas to traditional and modern industries. Bamboo and reed are supplied at a subsidized rate to paper and rayon pulp mills and free of charge to Kerala State Bamboo Corporation. The amount of bamboo and reed extracted from forest for a period of eight years is given in Table 3.

The mandate of Kerala State Bamboo Corporation (KSBC) was to ensure steady supply of raw material to the artisans. KSBC extracts reed (*O. travancorica* and *O. travancorica* var. *hirsuta)* selectively by employing licensed cutters from forest areas prior to extraction by paper mills. The extracted reeds are transported to various Reed Collection Centers and thereafter to Reed Distribution Centers. KSBC has 10 reed collection centers and 16 reed distribution centers. Against their allotment of 30000 tonnes during November 2001 to October 2002, it was able to extract only 16000 tonnes.

Utilization

The first paper mill was set up in Punalur, in 1890. Punalur Paper Mill had a capacity of 750 tonnes per year and in 1937 a modernization programme was initiated with the help of Forest Research Institute, Dehra Dun. The capacity of the mill was increased to 33,000 tonnes in 1972 and 50,000 tonnes in 1975. The long-term agreement of the government with the mill was to supply 85,000 tonnes of reed. The mill has been closed since 1986 and raw material shortage is one of the reasons for the closure.

In 1963, the Government invited Gwalior Rayons Silk Manufacturing (Weaving) Co. to establish a unit in Kerala. This unit used bamboo for manufacture of rayon grade pulp. The factory had a rated capacity of 200 tonnes/day. Initially the Government agreed to supply 160,000 tonnes bamboo and reed per year, which under later agreements scaled down to 40,000 tonnes/year. The factory has been closed since 2000.

Hindustan Newsprint Limited, a subsidiary of the Hindustan Paper Corporation, was set up in 1982-83. The Government promised to supply 189,000 tonnes of reed per year. The mill has a capacity to produce 80,000 tonnes newsprint per year.

Kerala State Bamboo Corporation has put up a unit for the manufacture of bambooply. The unit produces panels out of woven bamboo mats of finer variety. This unit employs about 100 persons. The unit used 20 M sq ft of mat for making bambooply during the period 1999-2000.

KSBC has about 25,000 registered weavers, of these 60% are women. Besides these there are about 1500 reed cutters and 600 loading and unloading workers. The Corporation produced 70 million sq. ft. of mat during the period 1999-2000. The total sale of mat panels was Rs.69 million.

Small-scale industries and co-operative societies depend mainly on the reeds supplied by KSBC through their reed distribution centers. There are about 59 Societies/SSIs of which many are not functioning.

Lack of raw material, poor quality, low income are some of the reasons mentioned for their decline. Most of the SSIs and co-operatives produce traditional mats and baskets that are sold in the local markets. However there are few units which produce handicraft items.

Uravu is an NGO working in the bamboo sector since 1996. Uravu has a design centre, training and production unit. It also does marketing of products. The centre has designed about 40 products in bamboo.

There are 40,000traditional workers from SC/ST communities in different Panchayats not depending on KSBC for raw material. The Panchayat data show that almost every Panchayat had bamboo workers from the traditional communities producing items of household and agricultural uses for local consumption. The SC communities like *Paraya, Pulaya, Mavilar* and *Vettua* had traditionally been doing weaving works. Due to shortage in raw material and marketing problems there has been a major shift of workers from bamboo sector since 1970s. Bamboo work as a family occupation is declining.

Bamboo work was prominent among tribal communities like *Pania, Kurichia, Kuruma, Koraga,* etc. Being in the vicinity of forest, bamboo was part of the tribal culture. Bamboo for housing, shoots for food, agricultural implements, etc. were some of the major uses. When construction of houses for tribals became the priority of Government, the use of bamboo was drastically reduced. So also the skills. Shift in agricultural priorities, availability of bamboo products from other parts of the state, difficulties in obtaining permits for extraction and movement from forests have all culminated in alienating the tribal population from bamboo work.

Marketing

The handicraft items are being mostly sold through Government sponsored Emporia, private traders and trade fairs. There is no mechanism to sell these products outside the state or abroad. Industries under modern sector have their own marketing mechanism for selling their products. The different routes of marketing of bamboo products are given in Figure 3.

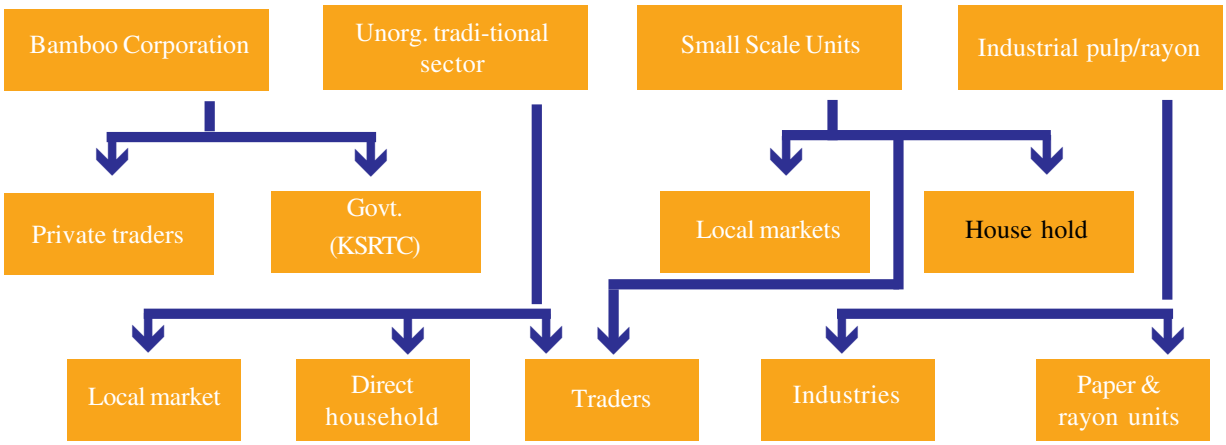

Fig. 3. Marketing of bamboo products from various sectors

Research

Kerala Forest Research Institute (KFRI) has done work on growing stock estimation, species diversity, nature of flowering and fruiting, ecological aspects, anatomy, methods for seed and vegetative propagation, plantation trials of commercial species, fertilizer requirements, improved methods of harvesting, pests and diseases and their control, properties and utilization and socio-economics. The details of work carried out during the last twenty years are reflected in KFRI's publications on bamboo (Appendix 3). The Institute has a Bamboo Information Center (BIC-INDIA), herbarium and a germplasm of 62 species collected from all over India.

Tropical Botanic Garden and Research Institute (TBGRI), a research institution under the Kerala State Council for Science and Technology and Environment, has established a bamboo germplasm collections at Palode. It has carried out research on bamboo propagation and it has supplied seedlings of various bamboo species to the Kerala Forest Development Corporation and farmers.

Silvicultural Research Wing of Kerala Forest Department has raised experimental plots of different bamboo species (for example *Dendrocalamus longispathus* in Nilambur). KFD also experimented on combined culture of bamboo with teak by underplanting.

Technology Transfer

Kerala Bureau of Industrial Promotion (K-Bip) is a body under the Ministry of Industries to promote industries in various sectors including the traditional sector. Recently, K-Bip has entered into a Memorandum of Understanding (MOU) with Asia Pacific Centre for Transfer of Technology (APCTT), a UN body. The MOU envisages establishment of a small business centre and evolving demonstration programmes for the promotion of traditional/rural sectors in the state. APCTT will provide technologies available in the Asia Pacific region. Bamboo has been identified as one of the sectors for development.

Problems of bamboo sector

A multitude of specific problems can be identified for the declined state of bamboo sector. It can be seen that most of the problems are inter-related and inter-dependent. Only by having a broader vision which looks at the problems in a holistic way can the sector be revived. Some of the specific problems are cited below.

In the early twentieth century, bamboo was available in plenty in the Kerala forests. The traditional communities, which depended on bamboo, did not have any problem to meet their raw material requirement. During the second World War the demand for bamboo mats increased manifold. To meet this demand, people from other communities entered the scene resulting in breaking the caste barrier connected with bamboo craft. With this came the problem of middlemen exploiting the bamboo workers. To protect the bamboo workers, Government established Kerala State Bamboo Corporation in 1971. The major problems of KSBC were that it was dealing with only one raw material, popularly known as reed bamboo, and

dealing with only one product, namely rough woven mat and limiting the distribution of raw material to a smaller area in the State. If KSBC distributed bamboo also and covered all the traditional workers in the state and diversified their product range it could have played a major role in uplifting the standard of traditional workers. Government's commitment to supply large quantities of bamboo and reed to attract modern industries to the state added to the problems of traditional workers resulting in shortage of raw material. With commitment to supply pulpwood, KFD was forced to convert natural forests rich in bamboo to pulpwood plantations instead of augmenting the bamboo resources. Lack of scientific management of gregarious flowered areas and lack of protection of natural regeneration and unsustainable harvesting of resources contributed to the depletion of bamboo resource base.

After the second World War the demand for bamboo mats declined sharply. KSBC was not geared to diversify the product range as per the market preference. The traditional workers did not have avenues to sell their limited number of products (mats, baskets and winnows) except in the domestic market nor could they visualize the potential market preferences for diversified bamboo products. Also the local supply of bamboo and reed had reduced to unsustainable levels. This resulted in under-employment in bamboo sector and many shifted to other fields for employment.

Although there are many species of bamboos available in the Western Ghats, hardly two or three species are commercially exploited. The information on suitable species, their nursery and plantation techniques available with the research institutions was not transferred to the field. Lack of proper extension mechanism in the research institutions along with lack of propaganda are responsible for this.

Although, the caste nature of the job was broken down at Angamaly and nearby areas when there was high demand for bamboo mats, there is no major change in many parts of Kerala. Bamboo craft is still associated with socially and economically weaker sections of the society. In spite of some efforts to improve their skills, the desired results have not been achieved. The younger generation is reluctant to continue this work. The inferior status and low wages are some of the reasons. To attract the younger generation, no training schemes in diversified products and no upgradation of technologies were carried out. In Kerala, marketing facilities for bamboo products have not been developed. Even the existing facilities are inadequate.

Even though a number of research projects had been carried out on various aspects of bamboo, objectives of many of the projects were not addressing the socio-economic demands of the traditional community.

Lack of a central agency to integrate different aspects of bamboo development has resulted in most of the above mentioned problems.

There is no standard pricing mechanism for bamboo. The cost of bamboo varies with region and uses. Methods should be evolved for costing of Forest Bamboo and Farm Bamboo. This will aid in gaining the confidence of farmers.

Bamboo falls within the purview of Section 2 of Indian Forest Act 1927. Hence all movement of bamboo is regulated under transit rules, even when grown by farmers in homesteads. In Kerala, where 63% of the annual yield of bamboo is from homesteads, legal status of bamboo has had a negative impact on local trade and consumption.

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"It is no secret that a lot of climate-change research is subject to opinion, that climate models sometimes disagree even on the signs of the future changes (e.g. drier vs. wetter future climate). The problem is, only sensational exaggeration makes the kind of story that will get politicians' — and readers' — attention. So, yes, climate scientists might exaggerate, but in today's world, this is the only way to assure any political action and thus more federal financing to reduce the scientific uncertainty."

- Monika Kopacz, Atmospheric Scientist