

BAMBOO: POOR MAN'S GOLD

*A case for developing the Bamboo sector in
India*

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Abstract:

From being termed as 'Poor Man's timber' to being called 'Green Gold', the perception of Bamboo, a versatile grass found mainly in Asia and Africa, has undergone a drastic change. However this recognition of the usefulness of Bamboo existed even in the ancient times, as is apparent from the Rig Veda which calls upon the Gods to 'Bestow upon us a hundred Bamboo clumps'. Only in recent years is it being increasingly realised what a valuable resource Bamboo is not only for the traditional subsistence economy but even the modern industrial one. The important characteristics that make Bamboo so useful are- (i) It has a short growth cycle which makes it highly renewable (the commercially important species mature in 4- 5 years) (ii) Different parts of the plant have different uses and are obtained at different stages of its growth thus rendering the plant useful during its entire life span (iii) Bamboo shoots of some species are edible and have high nutritional value (iv) The plant improves the environment in many significant ways including acting as an atmospheric and soil purifier¹. (v) It is hardy, light and flexible, thus a good substitute for wood². The significance of these properties has been studied in detail in the paper; here it will suffice to say that it is not without reason that Bamboo is looked upon as a miracle plant in many cultures.

As is clear from its properties and as has been recognised all over the world, Bamboo is a people's resource, more specifically a poor people's resource. While the inaccurate classification of Bamboo as a tree in our Forest laws bringing it under pervasive state control requires immediate rectification, the more important challenge is to not look upon Bamboo as an inferior forest produce suited for traditional and limited uses in the poor man's world but to explore its potential as a poor man's gold- a vast reserve of unutilised opportunity. One unsavoury argument explaining the poverty of newly independent India had been its capital scarcity and the tendency of people to store away available capital in its most unproductive form- gold. We cannot allow that to happen to Bamboo. As we have progressed upon our path of development, often attacked as inequitable and indifferent and even detrimental for the poor masses, we cannot afford to overlook this opportunity. India has to look beyond 'Information Technology' and its attendant fields as avenues for development. Promoting Bamboo is not just an endeavour to redress this skewed development patterns it makes economic sense too. The development of a vibrant Bamboo sector calls for a concerted effort towards blending together the traditional and modern technologies on one hand and balancing equity and efficiency considerations on the other. The State will have a big role to play in freeing the Bamboo resource from excessive and unproductive regulations and transforming the unorganised subsistence Bamboo sector into an organised high value one.

¹ releases more oxygen than equivalent strands of trees

² The tensile strength of Bamboo is greater than that of mild steel (28,000 lb/ sq in as compared to 23,000 lb/sq in)

EXECUTIVE SUMMARY

The purpose of this paper is to examine whether the Bamboo sector is a viable option for sustainable livelihood, determining the scope of Bamboo based industries in India as well as to evaluate the success of existing policies in harnessing this potential and suggesting the optimal Bamboo policy for the same. In a sense we are studying the Bamboo sector in India and looking into the extent of its development or the lack of it and the reasons for this. I will be doing so by focussing on the following dimensions of the study- (i) Supply Side (ii) Demand Side and (iii) Policy, Legislations and Institutions. Supply side includes the issues related to making adequate resource available in a form which allows it to be either directly consumed or used in secondary processing. Demand Side issues relates to the extent and potential market for Bamboo and its products, problems of missing, imperfect markets and access to these markets. We find that there exist both supply and demand constraints in the Bamboo sector, however while there are some genuine problems with both, many of the problems have arisen as a result of inappropriate policies in terms of supply augmentation and inadequate policies in terms of generation of demand. Bamboo on government forest lands, which is the bulk, is not easily accessible even to the forest dependent communities and poorly managed by the government. The private growers do not have incentive to grow Bamboo because of heavy regulations and under developed markets which do not translate into assured incomes. The third section gives an insight into the existing policy environment and helps us to determine how conducive it is in realising the potential which we ascertain from the first two sections. It is a critical examination of the State's role in developing this sector. The Case Studies on China brings out the salience of visionary reforms and effectively highlights the shortcomings in not only India's Bamboo Sector but also its Forest Management system of which the Bamboo sector is invariably a part. I also explore the unique case of the North East Region within India which has conditions more or less similar to China in terms of resource availability. The phenomena of Bamboo Flowering is studied with respect to its socio economic consequences as are relevant to this study. Since we are not concerned merely with development but sustainable development the implications for livelihood and the environment are also studied. Traditionally Bamboo has generated livelihood options for certain sections of the populations involved in Bamboo handicrafts, a significant majority of them belonging to the weaker sections including women. A need is felt to preserve these while at the same time the scope of this sector in terms of employment can be greatly expanded with private plantations being encouraged and primary processing happening within the rural set up. The salvaging of existing paper and pulp industries and setting up of industries for high end consumer products will boost industrial employment tremendously. Planning Commission figures suggest that employment in this sector in the long run could reach almost 50 million. Bamboo development has much to offer by way of environmental benefits too. Not only does it act as an atmosphere and soil purifier, its use as a substitute for wood entails a reduction on the pressure on natural forests. Biomass obtained from Bamboo is a highly renewable source of clean energy. Edible Bamboo shoots are also nutrient rich thus making them a possible source of nutritional security for the poor. Bamboo development in India poses a huge challenge and opportunity, only when we appreciate the magnitude of the opportunity can we have call forth the political will to develop this sector rapidly and holistically.

1. THE SUPPLY SIDE:

1.1 Extent and Distribution of Bamboo: According to the Forest Survey of India Bamboo covers 8.96 Million Hectares of forest area (approx. 12.8% of total forest area). It is found in all parts of India except the cold regions of Jammu and Kashmir³. From the map, Bamboo is concentrated in the North East region and Central regions of Madhya Pradesh and Chattisgarh. However while the area in North East is 28% of total area under Bamboo and for Madhya Pradesh and Chattisgarh it is also high at 20%, only 12 % of the total growing stock is found in these two states while 66% of the growing stock is found in the North East Region. This difference in productivity will be explained under the case study of the North East region. The more astounding difference in productivity however is between China and India, where the average productivity is 5 times the average productivity in India. Though China has the largest number of species of Bamboo, with India having the second largest genetic pool, India comes foremost in the percentage of total area under Bamboo. This divergence too is studied in detail as a comparative study between China and India⁴ The productivity in a Taiwan Plantation is also 20-30 MT per ha per annum- while the highest yield obtained in India is 5MT per ha in Assam.

1.2 Availability of Bamboo: The total growing stock of Bamboo is 80.43 m MT of which only 13.5 m MT is harvested annually; a mere 16.8 %.

³ The great diversity of species makes bamboo adaptable to many environments. It tolerates extreme precipitation from 30 to 250 inches of annual rainfall

⁴ Refer to Annexure 1

Box 1

Hiroshima , 1945: Bamboo provides first re-greening after atom bomb blasts

Limon, Costa Rica: Only Bamboo houses from the National Bamboo Project survive violent earthquake of 1992

Edison successfully used a carbonized Bamboo filament in his experiment with the first light bulb

A. Bell's first phonograph needle was made of Bamboo

Mahatma Gandhi set out on his famous Dandi march armed with his conviction and Bamboo stave!

Some species of Bamboo grow @ 1.5 m/day

Tensile Strength of Bamboo is greater than that of mild steel

Taiwanese comp launched first ever laptop with outer casing made from Bamboo

Polo balls made from Bamboo rhizome

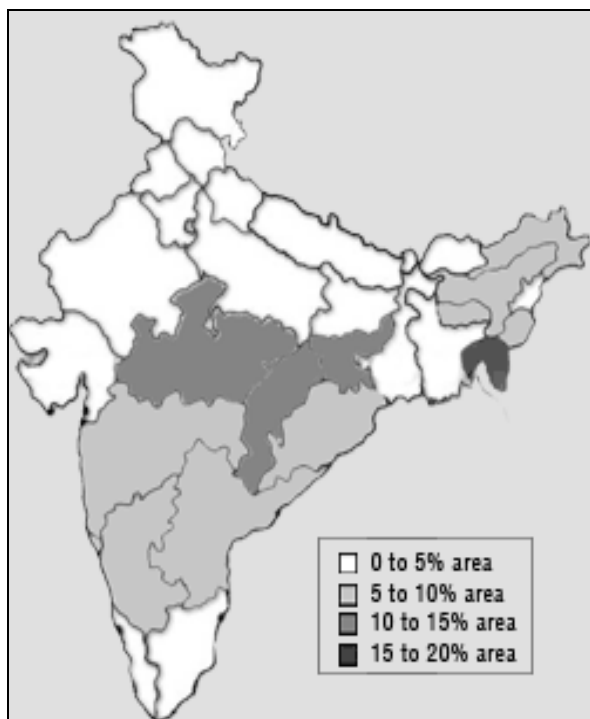


Table 1: Major Regions/States by Area under Bamboo.

State/region	Area (percentage)	Growing stock (percentage)
North East	28.0%	66%
Mizoram	8.45%	13.18%
Assam	7.54%	16.23%
Arunachal Pradesh	4.21%	11.91%
Manipur	3.39%	13.88%
Meghalaya	2.89%	5.34%
Tripura	0.86%	1.04%
Nagaland	0.70%	4.43%
Madhya Pradesh	20.3%	12%
Maharashtra	9.9%	5%
Orissa	8.7%	7%
Andhra Pradesh	7.4%	2%
Karnataka	5.5%	3%
Others	20.2%	5%

Source: Madhab Jayanta (2003) and the National Horticulture Mission at (http://agricoop.nic.in/AgriMinConf/National_hort_Mission.ppt.)

1.3 Supply Side Issues: The following constraints have been recognised across India which adversely affect the supply of Bamboo

(i) **Poor management and low productivity:** Despite the largest proportion of area under Bamboo low yields and improper management of the resource has meant amount of Bamboo that can be available for harvest is much lower than what it could be. While the government looks upon Bamboo as a secondary produce from forests, private growers also do not invest in it as a marketable resource and grow it for self consumption. In either case not much attention has been given to Bamboo cultivation.

(ii) **Restrictions on harvesting:** While harvest of Bamboo found in reserved forests is prohibited, even that found in protected and Village forests is subject to State Forest Laws. There is a plethora of problems associated with them but the most significant bottleneck is the classification of Bamboo as a tree in the Indian Forests Act (1927) which is a

primary legislation on forests in India. There are restrictions

Table 2

Ownership of Bamboos	Area in '000 hectares		
	1990	2000	2005
Bamboo under State Ownership	8,957	9,109	9,607
Bamboo under Private Ownership	1,754	1,754	1,754
Total	10,711	10,863	11361

Source: FAO (2006)

even on the harvest of Bamboo grown on private land in some states which look upon felled Bamboo as timber. The details of this set up are laid out in the section on Policy, legislation and Institutions

- (iii) Lack of intensive and scientific management: As nearly 67% of the Bamboo in India is clump forming it is difficult to harvest them from the forests where they grow in mostly congested groves which cannot be easily harvested. Given the vast variety of Bamboo and its nature as a special grass, the lack of application of scientific methods to its cultivation and poor post harvest treatment result in scant supply and poor quality of Bamboo supplied. The stage and manner of cultivation determine the utility of the Bamboo, however little attention is paid to it.
- (iv) Since there are few private plantations and Bamboo in forest lands is not adequately tended to they are over exploited and exposed to high risk biotic interference like forest fires (Bamboo groves are found to be more susceptible to them) and heavy grazing. Plantations of Bamboo are either raised from seeds or by vegetative propagation. The major hurdle in cultivation of Bamboo from seeds is the poor availability of planting material. Most of economically important Bamboo species bear seeds only two to three times in a century. Moreover, the viability of seeds is only for a short period.
- (v) What compounds the problem of poor maintenance and unsustainable harvesting is unique problem of gregarious flowering observed in Bamboos. Flowering of Bamboo occurs in cycles ranging from 1 year to 120 years for different species. Even the factors responsible for flowering have not been clearly understood till now. In the absence of adequate know-how regarding the same conservation and regeneration is a challenge that cannot be met by either the Forest Department or the individual growers. Bamboo clumps die after flowering hence the absence of definite information and adequate protection to seeds from biotic interference can mean destruction of seed banks. Long flowering cycles call for adequate management of existing clumps so that only mature clumps are harvested while young shoots are preserved. Producing Bamboo of required quantity and quality without sufficient scientific input is impossible). Closely related to this problem is the grave issue of famine that has been associated with Bamboo flowering in the North East. We revisit this problem in the section on the North East region.

2. THE DEMAND SIDE:

2.1 Uses and Utilisation: Bamboo has an astonishing 1500 documented uses and the number is growing with new development initiatives taken across the world. In the North East Bamboo is considered the 'cradle to coffin' timber due to extensive use in every-day life. Up to 30 day Bamboo shoots as food, Between 6-9 months: for basketry, Between 2-3 yrs: for laminates and boards and Between 3-6 years for construction These uses can be broadly classified as (i) Wood Substitutes and Composites (ii) Industrial Use and

Products (iii) Food Products (iv) Construction and structural application. The first category includes goods like Bamboo based panels, flooring and furniture. There are many advantages of Bamboo over wood in have come to light due to its rigidity, durability and insulation qualities and in recent years advances in design technology have mitigated problems like low productivity, varying quality and susceptibility to fungi and insects. The most important Industrial applications of Bamboo in India is in the paper and pulp mills, however some other lucrative options include using Bamboo as fuel, for producing electricity and Bamboo based fibre and fabric. Bamboo charcoal has gained popularity in international trade because of not only its high renewability but also because of its calorific value and absorption properties comparable to wood charcoal at the same time it is cheaper and easier to produce. The gasification of Bamboo which is a clean, cheap and renewable source of energy produces charcoal as a by product (approx. 15% of the biomass gasified) Further this process is independent of the quality, species, and maturity of Bamboo. Even Bamboo fibre is superior to cotton as it is naturally anti microbial and absorbs 3 times more moisture. Apart from these Bamboo can also be used in pharmaceuticals, creams, beverages and traditional medicines. Bamboo shoots are the most main item under food products. It is a local delicacy in the North East but China has cashed in on its appeal worldwide and earns US \$ 130 Million per annum from export of edible Bamboo Shoots. It is a telling fact that over one million people live in houses made of Bamboo or with Bamboo as the key structural, cladding or roofing element. Bamboo based pre fabricated houses can be constructed and dismantled easily. It is extensively used in Tsunami rehabilitation in India and is even used by the Indian Railways for reinforcement in concrete piles.⁵

Table 3 Consumption Pattern of Bamboos in India

Uses	Percentage Consumption
Pulp	35 %
Housing	20 %
Non-residential	5 %
Rural uses	20 %
Fuel (non – industrial)	8.5 %
Packing, including basket	5 %
Wood based industries and Transport	2.5 %
Furniture	1 %
Others, including ladders, mats etc.	3 %
Total	100 %

Source: Tewari, D.N. (1992)

⁵ Limon, Costa Rica: Only Bamboo houses from the National BAMBOO Project survive violent earthquake of 1992

India is different from other Bamboo-producing Asian countries because bulk of Bamboo consumption is not by artisans but by industries which use Bamboo for paper and rayon, scaffolding, and Bamboo boards. As we shall see subsequently this bias towards industries was not a result of efficient allocation of resources but a result of government policies. With changes taking place in the same represented by the New Forest Policy 1988 which has been implemented only in the last decade, a change in consumption patterns is expected to occur, however no official record of this is available at present

It is estimated that India has utilized only a tenth of its Bamboo-producing potential. The commercial consumption of Bamboo globally is worth around \$10 billion, India's share of this global market is estimated at \$1 billion while China's share is currently the highest at \$5 billion.

2.2 Potential and Constraints: The Bamboo based value added industry is expected to grow at a CAGR of 15% in the period from 2001 to 2015. India's Bamboo industry is expected to grow to Rs 16,000 Cr by 2012 and Rs 26,000 Cr by 2015. Its share in world trade in Bamboo which is Rs 2043 Cr currently is expected to be 27% of the total market of Rs 100,000 Cr

As we can see from the industry attractiveness matrix provided by the Planning Commission the prospects for not only the large but also small scale enterprises are bright. Further, as many as seven industries are in a stage of high readiness to accept Bamboo products, due to developed markets and processes which would mean profits will accrue to them immediately. Most of these industries also require primary processing to be done by the growers, thus making them an integral part of the value added supply chain.

Table 4

Product/Application	Current Market (Rs in Crore)	Expected by 2015 (Rs. in Crore)
Bamboo Shoot	5	300
Bamboo as wood substitute	10,000 (import value)	30,000 (in 20 years)
Bamboo Plyboard	200	500
Bamboo Plyboard (for trucks & railways)	1000	3400
Bamboo Flooring	100 (Domestic) 100 (Export)	1950
Bamboo pulp	100	2088
Bamboo Furniture	380	3265
Building and Construction Material		
Scaffolding	-	861
Housing	-	1163
Roads	-	274
Bamboo grids for Tiny/cottage sector (e.g. Agarbatti)	-	1000
Misc. Uses (ice creams, fireworks, pencils, matches etc.)	394	600

Source : Planning Commission : National Mission on Bamboo Technology and Trade Development.

MARKET READINESS	LOW	MEDIUM	HIGH	
	< Rs 250 Cr	Rs 250-500 Cr.	>Rs 500 Cr	
		Joint Venture Rs 455 Cr		LOW
		Housing Rs 250 Cr	Agarbatti/ Matchsticks, Pencils Rs 994 Cr	MED.
	Bamboo Flooring Rs 200 Cr Roads Rs 300 Cr	Bamboo Shoot: Rs 330 Cr Scaffolding : Rs 408 Cr	Bamboo Boards: Rs 1000 Cr Handicrafts Rs 1265 Cr Paper Pulp Rs 990 Cr	HIGH

All Bamboo based wood substitutes have extremely high viability with Internal Return (IRR) varying from 27%-30% (depending upon scale of manufacturing and cost of raw material). Replacing wood based panels and hard wood with Bamboo mat boards/flattened Bamboo boards and flooring tiles, is now a fairly well documented, demonstrated and commercialized technology. The Bamboo based ply is fairly competitive in its pricing and removal of bottlenecks on the supply side will only create further downward pressure on the prices.⁶

STRENGTHS	WEAKNESSES
Vast resources	Bamboo is less versatile than the Bamboo from China
Bamboo from the North East are hard and durable	Finished products from the other Asian countries are superior
Cane and Bamboo handicraft has good market	Lacks aesthetic appeal and quality control
India has strong roots in handicrafts	Poor market linkages
Labour cost is low	Product is bulky and transportation cost is high
	Industry and cultivators yet to recognize potential
OPPORTUNITIES	THREATS
Market for Bamboo Gazebo can be developed	There will be strong competition from other Asian countries.
Development in design and quality of handicraft products	Established players like China and Taiwan
There is scope for creating category product market	Poor treatment procedures may lead to loss.
	Treatment should be standardized

3. POLICY, LEGISLATIONS AND INSTITUTIONS

3.1. Policy Features: In India, Bamboo falls within forest tenure arrangements, since most Bamboo is interspersed amongst forestlands. The national laws and policies regulating forest tenure apply to Bamboo tenure. In looking at these policies it is helpful to examine them with

⁶. According to the association ASSOCHAM, in India, Defence, Railways, Central and State's Public Works Departments can cumulatively save nearly Rupees 7,000 crore annually on purchases of wood and wooden products if these are replaced by articles made of Bamboo.

respect to their objective, formulation and implementation. The objectives of the Forest Policy are clearly specified in the Policy Declarations. The first Forest Policy Declaration of independent India came in 1952; unfortunately it represented a continuation of the colonial policies in terms of the objective at least. The colonial government for obvious reasons had always espoused commercial interests in the Indian forest resources hence the policies were designed with the objective of extending state control to better facilitate the extraction of forest produce esp. timber. Even the National Forest Policy 1952 reinforced the right of state to exclusive control of forest protection, production and management. The major difference was that strategic imperial were replaced by commercial industrial ones however community rights continued to be unrecognized. The Forest Policy of 1988 marked the first real change in objectives with ecological services and meeting community needs becoming the focus. Despite a shift in focus, problems with formulation and implementation continue to persist. The formulation of laws is such that it has given rise to definitional anomalies and lack of harmonization of laws. On the execution front we find that extensive regulation and state control lead to the emergence of all those problems associated with a state undertaking – tedious procedures, red-tapism, inefficiency and rent seeking behaviour on the part of the Forest Department. The problems relating to objective and execution are applicable to the forest as a whole; those related to formulation are unique to the case of Bamboo.

In seeking to have an understanding of the issues relating to law formulation and its implications we must look at the following sources- Central Laws , State Laws and Judgments of Courts, the last is included as many difficulties have risen due to ambiguity in the interpretation of these laws. As Forests is a concurrent list subject, both the central and State governments are empowered to make laws on the same, but State laws have to necessarily conform to Central laws and cannot violate them. Beginning then with the Central laws the primary legislation with respect to Forests is the Indian Forests Act 1927 henceforth referred to as IFA. This Act includes Bamboo under the category trees. The inaccuracy of this classification notwithstanding the justification that it is for the sake of convenience is untenable when we look at the monumental consequences it has had for the Bamboo Sector. To begin with the Central Laws are significant from the definitional point of view and definitional anomalies have cropped up due to ambiguity in the definition of Bamboo, Forest Produce and Forests itself. Classification of Bamboo as a tree and hence felled Bamboo as timber means it is subject to a plethora of restrictions. These rules and regulations deal with three aspects- harvesting, transit and trade. Removal of forest produce is prohibited in reserved forests except by the Forest Department. In protected forests removal of timber and any other forest produce is to be done with written permission of the Forest Officer or in accordance with rules framed by the State Government. With respect to transit “the control of all timber and other forest produce in transit by land or water is vested in the State government, and it may make rules to regulate the transit of all timber and other forest produce.” We can infer that the definition of Bamboo is of relevance as it would determine which set of laws are applicable to it. The definition of Forest produce given in this act includes two categories of flora (i) Timber regardless of where it originates is forest produce (ii) Plants not being trees which originate from the forests. While the IFA on which most of the state laws are modelled defines felled Bamboo as timber the most

recent legislation Scheduled Tribes and Other Traditional Forest Dwellers Act (2006) classifies Bamboo as Non Timber Forest Produce (NTFP).

The question of where it originates is equally important. Bamboo may be found in either (i) Government forests (ii) Private Forests or (iii) Private plantations. All Bamboo originating from Government owned forest is subject to the central laws. Bamboo from Private forests is subject to state control if a State government follows the definitional pattern of IFA in which case it may or may not have its own laws on private forests. Bamboo from Private plantations is subject to rules and regulations of the Centre and State government only as long as Bamboo is considered a tree. Before we dwell further into the state wise scenario an overview of the landmark court judgments and their substance will be helpful.

The ban on felling of trees from all forests (1996) brought to fore the question of what is to be considered a forest? The term 'Forest has not been defined in any of the Central laws. While the Supreme Court banned the felling of trees in any forests in 1996 it also clarified later that Bamboo was not to be subject to this ban being a minor forest produce. The Court also ruled that "The ban will also not affect felling in any private plantation comprising of trees planted in any area which is not a forest. Following this the Ministry of Environment and Forests issued guidelines that "The term 'forest' shall not be applicable to the plantations raised on private lands, except notified private forests. Felling of trees in these private plantations shall be governed by the relevant provisions of various State Acts and Rules

The most well known case with regard to Forest Policy in India has been the *Godavarman Case* where the Supreme Court in its orders⁷ addressed a whole range of issues; among them the question of Bamboo. The conclusions thus drawn are to this effect:

- (i) Bamboo is a grass, thus felled Bamboo is not timber, further, Bamboos removed from non-forest areas including private lands are not forest produces
- (ii) Areas under private plantations are not forests and will be guided by various State Acts and Rules.

. Further the Orissa High Court has ruled that Bamboo is not a forest produce if it was brought from private land. In this case Bamboo will not be subject to either harvest or transit restrictions unless specifically required by state laws. Since Orissa follows the same definitional pattern as the IFA and India has a common law tradition⁸ this ruling applies to all states which follow the same definitional pattern.

Diagram 1

1927	1952	1988	1996	2006
IFA passed	Forest Policy	New Forest Policy	Timber Ban	Recognition of Forest Rights Act

⁷ This case is a part of the 'continuing mandamus' i.e. cases wherein the court does not pass final judgments but orders and directions with a view to monitor the functioning of the executive

⁸ Finding of a Rule of Law by a court creates a precedent that future courts are to follow

3.2. State Specific Study:

While central laws apply only to Bamboo originating from government with regard to harvest, State laws apply to Bamboo originating from private forests or plantations. The rules framed for removal of forest produce range from granting of licenses, examination at checkpoints for Bamboo resources from government land. In the case of Bamboo from private lands, prior to felling of any tree a certificate of origin has to be obtained from the state forest department and the relevant rules framed by the State are applicable. The issuance of transit permit is based on the certificate of origin. However by virtue of Bamboo being classified as a tree, transit rules apply to Bamboo irrespective of origin. Trade laws also exist in some states in order to ensure minimum price for produce, and in any case state monopoly in the distribution of Bamboo collected from Government forest lands has till recently been the norm.

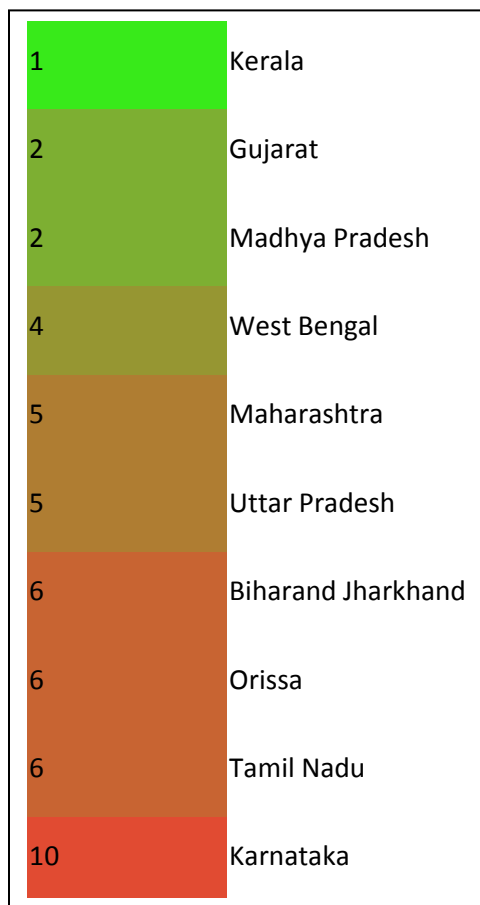


Diagram 2

From the previous section it is clear that the nature of State Laws really determine the level of regulation that will be observed in different parts of India with respect to Bamboo. It is noteworthy that of the 21 states where Bamboo is found substantially⁹, 19 follow the definitional pattern of IFA, the only exceptions are Andhra Pradesh and Sikkim. Of the 21 states, 10 have specific laws on private forests. Given this elaborate and often confusing array of rules and regulation, instead of studying the ten states where laws on private forests exist separately, I have attempted to create a rudimentary index of regulation to determine the extent of regulation on harvest, transit and trade of Bamboo.¹⁰ In this index comprises of the following variable

- (i) Whether Bamboo is classified as a tree or grass (since timber is subject to greater regulatory control than forest produce
- (ii) Harvest Rules (a value ranging between 1-3 was assigned according to scope of the rule and the costs it inflicted upon the private party)
- (iii) Transit Rules (similarly constructed)
- (iv) Onus of proof: This variable captures whether the onus of proof of a forest offence lies with the

private party or the forest official

⁹ Two or more commercially important species found

¹⁰ This index only captures the extent of regulation faced by the private growers The equally vital issue of the state of affairs with respect to Forest dependent communities (difficulties in procuring materials like Bamboo from government forests) is dealt with in a descriptive manner

In this Index a greater index value corresponds to greater regulation of Bamboo. If we consider a situation where only the Bamboo from government forests is regulated, the Index value we would obtain is '2'. Thus we can see from the list that 70% of the states have regulation that's higher than this benchmark level which is suggestive of structure that throttles private enterprise in the Bamboo sector. A high index of regulation suggests that individual growers interact with the Forest Department a greater number of times, also in some cases prescribed monetary costs are borne by the private party in the form of fees for applications for passes, transit permits etc. There are of course unaccounted for costs of transport and other inconveniences borne by the individual and we can safely assume costs arising out of rent seeking behaviour of the officials. As it was pointed out these are the snags in implementation, however apart from inefficient functioning we must also look at other deficiencies in the institutional set up.

The point being made here pertains to the complex nature of the set of laws governing the harvest, transit and trade is self evident from the amount of literature that has gone into its explanation. Indeed there is more than a theoretical point to be made here; not only has Bamboo been wrongly subject to rules and regulations not designed for it, this set of rules and regulations is not even unambiguously defined, which clearly hampers the ability of the common farmer, who are affected by these laws to make perfect and clear sense out of them.

3.3. Institutional Arrangements:

Referring back to table 2 we find that nearly 85% of the area where Bamboo grows is government owned land while only 15% is owned privately. Since Bamboo coming from forests owned by the government will necessarily be forest produce, it would still be the Forest Department (the government agency) which would have control if not responsibility for this resource. This brings us to the larger question of the nature of the institutions governing forests in India. In itself this is a vast topic and we will do ourselves a favour by investigating those areas which are relevant for this study.

According to official estimates, 93% of India's forest area is controlled by the Forest Department and 4% by the Revenue Department. In contrast, 3% of India's forests are owned by private landowners—corporations, communities, and individuals. Corporate bodies and communities own 1.5% of the forests (ICFRE 1996). Most productive forestry is on private forestlands or non-forestlands (which may be either private or public). Most Bamboo is located on government owned lands, although most success stories—in terms of Bamboo quantity and quality—are on privately owned small-scale Bamboo lands owned by communities, villages and individuals. The private sector has been successful because they have the incentive to grow Bamboo for their own internal consumption, and after years of experience with Bamboo growing naturally on their lands, they also have the technical expertise to manage the resource properly. In contrast, on government lands, the government pays unskilled day laborers to manage 4-year rotations of Bamboo. The village communities are not involved in the management of these Bamboo stands, as they have little incentive to do so. As Bamboo requires intensive management, the stands in government lands perform poorly compared to

stands on privately managed lands. This explains the better productivity observed in private lands. As we had stated earlier the Forest Policy of 1952 was guided by commercial industrial interests and thus there was a practice of subsidizing raw material from the forests for industrial use including Bamboo. Under this scheme of things industry (esp. the paper and pulp industry which was the first to find some industrial use for Bamboo) obtained Bamboo at subsidised rates while the forest dependent communities whose rights had been completely overlooked struggled to procure Bamboo even for their sustenance. While it led to illegal harvesting to some extent it also adversely affected the handicrafts sector which was the livelihood of many tribal communities. The price of Bamboo in the open market were extremely high (due to supply shortage) and even the available Bamboo was not of the quality required by the artisans¹¹ Though India has undergone significant forest policy reforms in recent years, as part of its attempt to liberalize its economy, including a shift towards encouraging private sector participation in forestry, real changes on the ground are yet to unfold. 1993 marked the passage of a new forest policy encouraging a more active role from the private sector in sourcing their own raw material, whilst the government focused on community development and poverty alleviation. The policy shift to encourage the private sector to source its own raw material was a direct result of a new emphasis on using state forestlands for community development. In an attempt to get communities to play a greater role in the protection and management of government forests, the government introduced the Joint Forest Management (JFM) program. Around 63,000 community groups are protecting over 18% of forestlands under the JFM program. While the local communities benefit from the initiatives of Joint Forest Management by sharing in the revenue or produce from the forest, Bamboo forestlands have not been brought under JFM. One of the important handicaps of the JFM is that the forest dependent

¹¹ Handicrafts require green Bamboo representing a level of maturity which is of little consequence for industrial uses like in paper mills

Box 2

There two important Bamboo artisan communities of Chattisgarh viz. Kandra and Basod belonging to the Scheduled Tribes which are involved in the manufacture of Bamboo handicrafts. They were Issued Bamboo Ration Card for getting Bamboo from government owned depots. at lower rates as part of the measures to implement the New Forest Policy of 1988.

They produce articles like Mats, hats, baskets etc. which they sell themselves in Local weekly markets or through whole sellers and retailers. Most of these families have now shifted away from Bamboo handicraft production as a source of livelihood. In North ad South Chattisgarh only 5 % of families from these communities rely solely on Bamboo for their livelihood, the figure is 10% for Central Chattisgarh

The causes of this shfit can be traced to the shortage of and poor quality of Bamboo supplied on the cards and high prices of Bamboo available in the open market. Their use of outdated and very laborious technologies and lack of proper and systematic marketing channels has meant little or no profitability of this activity.

Registered Basods	Actual Target	Available	Sold
5227	1500	556	427.6
	(100%)	(37%)	(28.5%)

communities have no legally enforceable rights and are still at the mercy of the Forest Department. Post the Forest Policy of 1988; by way of implementation depots were opened by many state forest departments to distribute Bamboo at subsidized rates to the artisans. This is hardly the solution as the case study given below shows. Also the 3 main weaknesses of the Forest tenure system pervade the system of control of Bamboo too. These are:

- (i) **Lack of tenure Security:** Nationalization of natural resources often raises the likelihood that the customary rights or participatory rights of local communities will be sidelined by the interests of the state. Despite the change in policy and various schemes aimed at encouraging people to participate in forest management like JFM—even if they succeed in enlisting the support of the local inhabitants—cannot be a substitute for legal rights. The Recognition of Forest Rights is the first concrete step towards redressing this injustice, however once again as long as the IFA classifies Bamboo as a tree the provisions regarding Minor Forest Produce (the rightful category to which Bamboo from government forest land should belong) will not apply to it.
- (ii) **Lack of full and equal rights:** Better management of Forests and better productivity can be brought about through participatory resource management only when the people feel they have a stake in it i.e. their basic requirements are being adequately fulfilled and they have a sense of ownership of the resource. Granting them legal rights is a prerequisite for this. Involvement in decision making is another key requirement. Under the earlier policy the Forest Department and indiscriminately promoted Eucalyptus a fast growing tree in order to fulfil timber needs. While Eucalyptus is an alien species in many parts, Bamboo would have proven to be a better choice. Such decisions when left to the people can yield positive outcomes as they can judge their needs and even provide traditional knowledge that Forest Department may not take into consideration
- (iii) **Lack of free market mechanisms:** In many states, the state government has what amounts to monopoly rights over the collection and sale of non-timber forest products (NTFPs), through either forest departments, state-run forest development corporations, or designated agencies called LAMPS (Large Scale Adivasi Multi-Purpose Cooperative Societies) (Hazra 2002, Saigal et. 2002). Because there is no free market for the sale of their forest produce, the products are sold far below their actual value. In a competitive and efficient market system, there should be a large number of buyers and sellers, whereas in India local communities can only sell their produce to a limited number of buyers permitted and approved by the Forestry Department (Hazra 2002). The purchase price is usually fixed by the state, which is advantageous to the Forestry Department but disadvantageous to the local community.

3.4. Implications:

The implication of such a policy and institutional set up for the Bamboo economy has been that the potential of this sector is largely unutilized and in many cases undiscovered. An unorganized subsistence Bamboo economy has come into being. Given the distribution and nature of this resource even a set up where the resource was nationalized could have yielded some positive outcome in terms of better management and initial investment if the government had recognized its potential and worked towards realizing it. Unfortunately Bamboo has been accorded secondary importance both by the forest department and farmers; while productivity in both private and state lands has remained at a low level vis-à-vis other countries but private lands have a higher productivity as compared to state owned land. The reasons for the state of affairs can be understood as implications of the policy regime. In state owned forests, Bamboo grows in the wild, and almost no attention is given to its proper cultivation and sustainable and scientific harvesting techniques. It is perceived as an inferior product even by the forest department whose main source of revenue is timber. The interests of the people are subverted to the interests of the State and till recently the industry. Policy changes with corresponding modifications in all relevant laws and functioning of institutions results in less

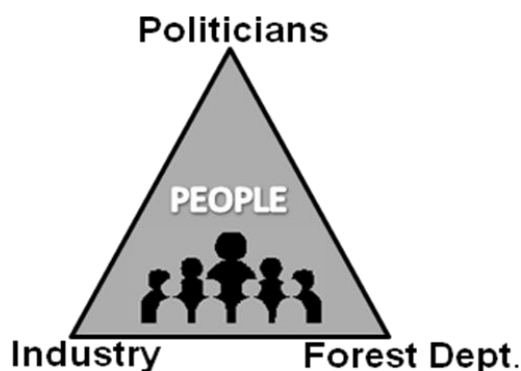


Diagram 3

than desirable impact on augmenting supply. As the example in Box No. 3 shows contradictions between government programs also arise frequently which undermine the benefits to the poor. Since granting

Often different departments of government pull in different directions, as their programmes are not only not well coordinated but these contradict each other.. Take the case of the Korachas, a scheduled caste group resident in Shimoga District of Karnataka. They have traditionally eked out their livelihood making baskets using Bamboo available in the forest. In recent years, these artisans have been deprived of their access to Bamboo as forest officials had taken stringent measures to stop them from cutting Bamboo shoots in the forest. The Korachas predicament has been made worse by apparently well-meaning government programmes. In the name of developing the craft of basket making, the Government of Karnataka initiated several programmes for them. The important ones were the IRDP and VISWA (programme for artisans) programmes under which hundreds of Koracha families have received financial assistance. Alleviating poverty is the central objective of these programmes, but what they have apparently achieved is make these families even more indebted, this time to bankers. Unable to access Bamboo, they have found it difficult to repay their loans and have been categorised as defaulters. It remains a puzzle for the Korachas why the government helps them with finance to promote their craft on the one hand and then prevents them from accessing the raw material required to make the baskets, on the other. The explanation may well lie in that age old truism about bureaucracies: the left hand doesn't know what the right hand does.

greater authority to communities necessarily entails a reduction in power by the state there has been a great deal bureaucratic resistance. Given the difficulties that we face in determining the status of Bamboo in India the implementation has been far from sound.

The misguided objectives however did create a mammoth structure of State control of which is proving difficult to dismantle. The possible arguments that the Ministry of Forests and Environment could have against the granting of rights to forest dependent communities viz. (i) that it would encourage illegal felling and (ii) would mean a loss of royalty are both untenable. The former because it reflects a preventive rather than curative view of forest regulation and in a way is an advertisement of the inefficiency of the Forest Department and carrying out its primary responsibility of protecting the forests. If it were to shift its focus from collection of forest produce like Bamboo, it will ensure adequate resources are dedicated to playing a supervisory role to prevent overexploitation rather than bluntly ruling out the possibility of communities managing a resource. Also royalties earned by the ministry from private growers can hardly be a substantial sum given the percentage of Bamboo grown on private lands unless we take into account bribes etc. which should be discouraged to say the least.

As we have seen it is both a demand and supply problem, but not only have policies failed to augment demand and supply, existing policies in fact distort incentives for private growers. For example the cost of 1 Pole of *Dendrocalamus Strictus* is Rs 10 on site but its cost on reaching Hyderabad city escalates to Rs 40 per pole. Even in making production decisions Bamboo has to compete with other crops like food crops whose production is heavily subsidized¹². These factors limit the inputs that the farmer is willing to invest in Bamboo. Though the new policies have been designed to encourage industries to source their raw material requirements from the farmers it is not a self fulfilling prophecy. Not only are the demand and supply chains not fully developed, the anticipated backward and forward linkages will take a while to form with a active intervention from the government. This calls for sustained and comprehensive efforts which not piecemeal actions. Thus not only the approach but a new set of institutions with different aims dedicated to the development of Bamboo will have to be established.

¹² Inputs like water and electricity for agricultural crops as well as HYV seeds and fertilizers for food crops and important commercial crops

3.5. The New Approach:

The account of the Bamboo Sector in India is incomplete without description of the new approach that made its appearance with the setting up of the National Bamboo Mission under the aegis of the Ministry of Food and Agriculture in 2005. As stated in its charter, the principal objectives of the Mission are to (DOAC 2005):

1. use bamboo development as an instrument of poverty alleviation and employment generation, particularly in the rural sector;
2. diversify, modernize and expand bamboo based industries through the application of modern technology and financial support; and
3. use bamboo as a means to achieve ecological security through plantation of quality species needed by the industry and the handicrafts sector.

The mission model has been adopted in this effort to promote Bamboo. Micro missions under different ministries have been set up; the important ones being the Micro mission for:

- (i) Technology Development
- (ii) Policy
- (iii) Marketing
- (iv) Trade and Development

The detailed organisational structure of the NBM has been provided in Annexure 4. The other prominent organization is the National Mission on Bamboo Applications (NMBA). At the state level, a number of states such as Mizoram (a state with abundant bamboo resources) and Kerala have established their own Bamboo Development Agencies to develop and promote activities that encourage bamboo development.

While this is a well meaning comprehensive approach the implementation will still encounter some basic handicaps. The first hurdle would be one of co-ordination. Though the Planning Commission considered a coordinating agency between different departments, no such agency has come up till now. Many agencies with similar functions and overlapping jurisdictions exist. With 5 ministries and nearly 25 different institutions being roped in, it could well prove hazardous for a sector which requires immediate and concentrated efforts, before India becomes a basket case once again. Also the biggest challenge would be the defective underlying Forest Management system and ambiguous laws. This model is also different from the model adopted to promote a commercial crop like tea where a Tea Board was set up. One important distinction between the two is that the officials appointed to the Tea Board are solely responsible for their work in this organization, while those in the NBM are there by virtue of their holding another post and are not singularly dedicated to the purpose of Bamboo development. Clearly only a good performance only would justify the presence of an autonomous body like the Tea Board.

4. CHINA:

With regard to the role of the government in promoting the Bamboo sector the experience of China is instructive. China has been recognized as the Bamboo Kingdom, as it has the largest Bamboo resources and has put them to good use. Though the area under Bamboo cultivation is 5 million hectares significantly lower than that in India, due to the higher productivity¹³ and government efforts China's Bamboo economy is worth over US \$ 6 billion with export value amounting to US \$ 600 million. China has captured 50% of the trade share in Bamboo products by leveraging the first mover advantage. This of course is not an over night phenomena, on the contrary it is the result of 4 decades of planned development. Yet the success of China's Bamboo sector is as much a outcome of liberalization as it is of planning. Post 1985 the state system of procurement was abolished and the market for Bamboo was opened and prices completely determined by forces of supply and demand. Thus the planned efforts were geared towards facilitating the better functioning of the market than replacing it. Export and private enterprise culture was promoted; dragonhead enterprises which would spearhead this sector were selected and granted special concessions, Bamboo industry zones were also set up in Bamboo rich areas. Though an unexamined replication of this model is not advisable I shall focus on the state's part in this development.

I begin therefore by looking at the development sequence followed by China

Phase 1: Later 1970s- Early 1980s

- Rural System Reform: Unlike India, the de-collectivization of forestlands in China was a big success in what had been a long history of failed land reforms. Farmers now have unprecedented autonomy in managing Bamboo forestland leased from collectives, with a reasonable operating term.
- Collective Responsibility-> Household Responsibility Scheme: Under the household responsibility system, farmers can make their own decisions about when and how to plant, manage and harvest their timber and Bamboo, and where and at what prices to sell their products. Also, within the contract period, the farmers can transfer the leased land to others and leave it to their successors
- Bamboo product marketing system: State Monopoly -> Free Market

The success of de-collectivization is evident from the increase in China's forest coverage, which rose from 12.98% in 1980 to 18.21% in 2005 (SFA 2005)

Phase 2: Middle 1990s: 3 Pronged Stabilization

- Stabilization of
 - (i) Mountain and Forest Property

¹³ Most of the Bamboo found in China is non-clump farming which could partially explain the higher productivity, the positive role of the state however cannot be overlooked

- (ii) Self Processed Mountain Property
- (iii) Household Responsibility Scheme

In 2002, China passed a new law on leasing rural land, which laid out several provisions on granting user rights on forestlands to farmer households for up to 70 years, protecting the legal rights to forestland held by farmers from being violated by any individuals and organizations. It is very difficult for those without tenure security to take good care of the land as they have less incentive to manage for the long-term. In the second phase the focus was on stability; aimed at assuring farmers of long term returns thus inducing investment and better care which lead to the quality and quantity of Bamboo forests resources improving greatly.

Phase 3: 2006 onwards

- Forestry System Reforms including Bamboo
- From right to management to Right to ownership which allows farmers to transfer, transact or circulate as property
- Sundry taxes and fees exempted In 2001
- Subsidized funds and fertilizers
- Export tax refunding for Bamboo products

These measures as they increased profitability of Bamboo plantations encouraged farmers to develop new Bamboo plantation and improve existing low yield and low value ones thus facilitating expansion and export. It also spurred more intensive processing of Bamboo for higher value addition.

Having understood the policy framework we now take up a comparison of the institutional arrangements in both countries

China	India
Ownership and Management Rights with individuals	Ownership and Management rights not clearly defined. Differ from state to state
Bamboo related Institutional Arrangements cover all aspects	Till recently the institutions focused on dist of Bamboo to local and industrial units. NBM, NMBA, CTBC etc launched
Organizational Arrangements for Bamboo Management- Multi layer and Multi regional (Forestry Bureau also follows the same form	Administrative structure U form- Independent forest departments exist only at the state level

Local level governments have little bargaining power but greater autonomy. Ability to design dynamic institutions	Institutions designed at the state level. Institutional inertia, attitudinal inertia and non-accountability
Market Research and Product diversification-private enterprises put great emphasis on market research. Responds to world demand. Consumer items+ new industrial items	Till recently even basic data abt Bamboo was absent. Traditional products, Industrial use limited to Pulp
In Bamboo – dominant areas Bamboo has played a critical role in poverty eradication	Bamboo mainly used for benefit for industry (esp. pulp mills) and subsistence at village levels
Diverse ownership and management arrangements, all units compete for Bamboo (raw material) in an open competitive mkt. State has no role to play in supply to these units	In some states industrial units still dependent on state for supply of raw materials so are rural artisans. Classic case of cross subsidization of rich by poor
Institutional Arrangements are:	Institutional Arrangements are:
Complete	Partial
Decentralized	Centralized
Diverse	Narrow
Flexible	Full of rigidities
Responsive to local needs	Non responsive to local needs
Responsive to other subsectors	Non responsive to other sub sectors
Aimed at equity consistent economic efficiency	Aimed at profit maximization of ind. Units and subsistence of poor

As we can fathom this was a well chalked out process which was initiated by laying the groundwork then building upon it. This suggests that the Chinese government not only realized the potential of this sector but also had a clear vision and strategy for achieving it, something that is sorely lacking in India's approach to the development of its Bamboo sector.

5. THE NORTH-EAST STORY:

The North East region is one of the most Bamboo rich regions in the country. This is evident from table 1 and the table given here. The Bamboo found in North East is also mainly non-clump forming; making it amenable to harvesting.

	In the Country	In the NER
Number of genera	22	16
Number of species	136	89
Total estimated stock	90 million tonnes	
Total area under bamboo	8.96 million hectares	3.10 million hectares

Bamboo shoots are considered a delicacy in the North East. Bamboo is also used extensively in the neighbouring countries like Bangladesh, Myanmar, which explains the smuggling of Bamboo to these regions, while the illegality of the exercise itself can be explained by the restrictions imposed by the laws and rules. The focal point of this section though is the problem of gregarious flowering of Bamboo which had earlier been including under the factors constraining the supply of Bamboo. This phenomenon merits a closer scrutiny as it poses a serious challenge not only for the North eastern states but also in other states as it is a natural phenomenon. There are certain socio- cultural aspects to the occurrence but we are concerned here with its implication for the economy of the North East and at a broader level the sustainability of Bamboo as a natural resource.

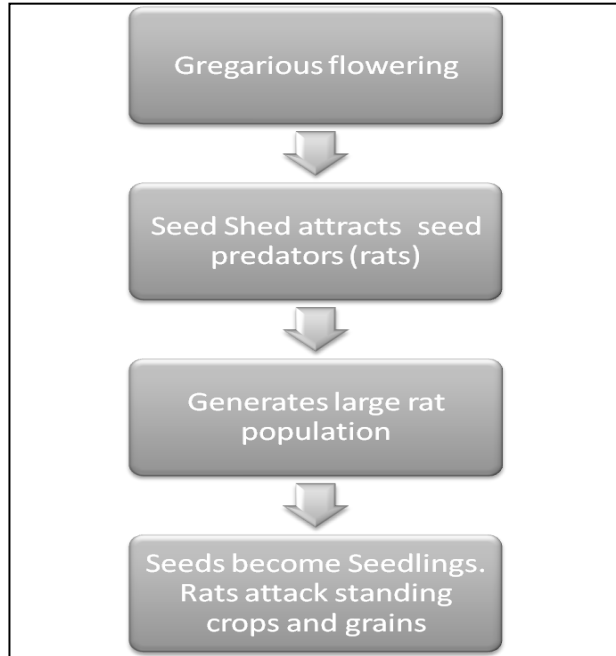


Diagram 4

First let us look at the scientific facts related to Bamboo flowering;

Under natural conditions, Bamboo seeds germinate in rainy season after gregarious flowering plantations of Bamboo are either raised from seeds or by vegetative propagation. The major hurdle in cultivation of Bamboo from seeds is the poor availability of planting material. Most of economically important Bamboo species bear seeds only 2 to 3 times in a century. Flowering of *Melocanna bacciefera*, *Bambusa Tulda* and *Dendrocalamus longispathus* in North East with its epicentre in Mizoram happen in cycles of 48 years. The Bamboo dies after flowering. The story however does not end here. The last time Bamboo in this region flowered in 1959 it lead to a famine. Studies on this apparently strange co incidence reveal the causal relationship shown in the diagram.

In this process the rapid transition from the summer to the rainy season is important; it is during this time that the seeds germinate into seedlings, leaving the large rat population little to survive on. This scarcity forces the rodents to attack standing crops and stored grains.

Further the seedlings prove to be ample food for the herbivores which also hampers regeneration. The period of flowering is known locally as *Mau-tam* (for *Melocanna Bambusoides*) and *Thing-tam* (for *Bambusa Tulda* and *Dendrocalamus*). In Mizo language *Tam* means death. Not surprisingly for the locals the flowering of Bamboo represents impending doom.

The sentiments of the people in this region are not limited to fear, when the famine struck in 1959, this fear quickly took the form of resentment and anger against the government when it failed to act on the warnings of the local populace. The insurgency in Mizoram was actually a direct result of the Assam government neglect of the people's plight during these years. The Assam government then had refused to take any pre-emptive steps dismissing the fears of the Mizo people as having no scientific backing, given the accepted belief that famines cannot be predicted beforehand. It was this attitude of the state and its poor and under-prepared response to the famine that fuelled the Mizo insurgency movement under the leadership of the Mizo National Front (MNF).

Bamboo flowering was expected to reoccur during the period 2004-07 in an area of 18 thousand sq. km. in North East India. Almost 26 million tones of Bamboo, of which 10 MT is accessible, would have been available if harvested before flowering. The government did not repeat the mistake of ignoring the event this time; however preparations for it started only a few years before, thus many of the measures under the Combat schemes are short-term measures. Not much has been done over the years to develop the Bamboo sector in this region.

The primary area of concern of the government has been to prevent the famine rather than optimization of the resources that would be made available due to the flowering. The BAFFACOS is a 5-year programme launched by the Mizo government for the

- Early Harvesting of Bamboo
- Rodent Control
- Agricultural Diversification

Although official records have claimed success in fulfilling all these objectives, the results are at variance with independent studies undertaken by organizations like ActionAid India and a majority of the media reports support the latter findings. Ironically The Government of Mizoram declared the *Mautam* as a disaster in 2007 while its achievement reports portray a different picture all together. The media reports of misreporting, corruption and embezzlement of funds allocated for disaster relief would seem to corroborate well the idea that the funds have not been put to the use they should have, and at least some section in the government has looked upon this as an opportunity to milk some money. If the people's verdict of 2008 i.e. the ouster of incumbent Chief Minister Zoramthanga's one of the leaders of the MNF movement post the famine, is anything to go by, the situation is far from under control.

This is quite unfortunate because as much as the Mautam was a challenge it also represented an opportunity for the people of the North East to carve a economic space for themselves by

leveraging their natural advantage in this sector to bring about much needed development. The revival of paper and pulp factories concentrated in this region, which were shut down after the timber ban, by using Bamboo as raw material should be accorded priority. The existing tradition of consuming Bamboo shoots will also make it suitable to develop the Bamboo shoot industry in this region, as it has great export potential. Given these factors and the familiarity of the locals with the resource a strategy for all round development of this region could be undertaken by the state. Declaring North East as a Bamboo Zone on the lines of those developed in China is an option the government should give serious thought too. While SEZs may have efficiency as its main justification, a Bamboo Zone would have much to offer the people of the region if they are the ones who own the resource. While in the long run the idea is to have a vibrant Bamboo sector all over India since the resource is available in abundance across the country, the North East region could spearhead and become a model for the others.

6. LIVELIHOOD:

India is primarily a rural country with about three-quarters of its population residing in its 600,000 villages. Out of these, an estimated 170,000 villages with a total population of 147 million are located in the vicinity of forests (FSI 1999). A vast majority of the Indian population depends on forests for meeting basic needs. Because of its many uses—including agricultural implements, handicrafts, construction material, as food, fodder and medicine—Bamboo is in great demand throughout the country. Bamboo craft is one of the oldest of traditional cottage industries in India. The origin of this rural craft is traced from the beginning of the civilisation when man started cultivation of food crops thousands of years back. People started making baskets, mats and many other products of household use with Bamboo that was abundantly available in nearby forests. Later, tribal

Box 4

The Arunachal Pradesh Industries Limited which was earlier a Plywood factory was converted into a Bamboo board manufacturing unit due to the unavailability of raw materials after the ban on timber by the Supreme Court (1996). FIPPI agreed to convert it into a Bamboo board industry. During this process it faced numerous procedural handicaps. The factory closed 18 times during the conversion process due to different interpretations of the SC order by different forest officers. It only started functioning regularly from 2006 after intervention by Planning Commission. APIL set up ancillary units in remote villages with a buyback arrangement in order to ensure a regular supply of processed Bamboo for its factory.

The experience of APIL suggests that in the presence of procedural impediments it is not possible for industry to flourish. There is a need for systematic not piecemeal approach to be adopted. Also the arrangement put in place takes care of demand-supply problem through the assured buy back policy. It also promotes local entrepreneurship and sustainable livelihood opportunities for the local populace. It has been estimated that a requirement of 1 lakh mats can generate employment to 33,000 persons of these 90% of mat makers are women. There is also an increase in productivity for example the agreement to procure mats from 38 villages in Nagaland lead to an increase in the supply from 700 to 10,000 units/month. Even in Splint manufacturing units more than 100% value addition happens.

and rural people in the vicinity of Bamboo forest took up this as a means of livelihood.

In terms of employment, the Bamboo sector currently generates 432 million workdays annually. Bamboo based handicrafts alone employ nearly 10 million people. The noteworthy aspects of this employment is that women constitute a majority of the mat weaving and Bamboo crafts work and out of 68 million tribal population, 50% depend on Non Timber Forest Produces like Bamboo for their livelihood requirement. As of now the paper and pulp industry is the only major industry to provide employment to the people. The Bamboo sector can potentially provide in the following ways:

- (i) Direct employment (Plantation, maintenance and extraction),
- (ii) Self-employment (craft workers),
- (iii) Secondary employment based on forest industries.

Statistics reveal that a single hectare of Bamboo plantation with 500 clumps generates about 384 work days of unskilled labour and 48 workdays for supervisory staff over a period of 30 days. (Tiwari, 1992)

Over the years not only have livelihoods of people dependent on Bamboo been threatened, the industrial enterprises too have suffered setbacks due to improper and unsustainable management of the resource. The unavailability of raw materials and the inadequate quality has lead artisans to shift away from Bamboo crafts. The change in policy while it did not bring any real benefits to the people proved to be a big blow to the industries dependent on Bamboo. The state was found unwilling to supply raw material while the private growers were in no position to do so. Thus livelihood options of the rural population as a whole have been seriously compromised due to faulty policies and half baked solutions of the government.

Box 5

The Sindhudurg Model: In Konkan region of Maharashtra the traditional Bamboo working communities are Scheduled Castes. The widespread use of plastic has reduced demand and limited opportunities. The Konkan Bamboo and Cane Dev Centre (KONBAC) and University Dept of Life Sciences, University of Mumbai Initiated a community based Bamboo development Program. Under this establishment and demonstration of the following was taken up:

- (i) 1 Community - based BAMBOO treatment Plant
- (ii) Bamboo Furniture Manufacturing Unit
- (iii) Bamboo based marketing Hubs (BAMHU)
- (iv) Passenger Resting Shade at Ratnagiri Railway Station
- (v) First ever All Bamboo Resort

The government thus took care of the demand constraint as well as provided the extension facilities that would promote development of this sector since the artisans themselves could not take them up

Tamil Nadu Contract Farming

Model: Due to the timber ban a mismatch of demand and Supply at Paper mills lead to massive wood pulp import. The Tamil Nadu Newsprint and Papers (TNPL) initiated farm and agro-forestry programs. A contract in this case is an agreement between growers and processors. Contract Farming is viewed to benefit user agency by ensuring sustained raw material supply. However In the age of liberalization and Globalization there is a danger that small scale farmers will find it difficult to fully participate in the market economy. In many cases small farmers could be marginalized as large farms become more profitable. Leads to increasing area under private farms and forestry plantation through industrial participation

The local and regional developmental role that Bamboo has played over the centuries of local exploitation in the Bamboo growing regions of India is however well documented. In many regions of India the Bamboo resource has been used by the local inhabitants as a vital raw material on which their material culture is centrally dependent. The centuries of use and experience are embedded in the local knowledge systems that we are just now beginning to appreciate and adopt for contemporary applications. However the beneficial role of Bamboo in the social and economic development of these communities is not fully understood by the general population and needs to be promoted by suitable communication efforts to enhance the status of this resource in the minds of the modern Indian. Myths associated with this resource too need to be explained before a broader acceptance of the full potential of Bamboo as a tool for human development can be realised in India. There is a need to address the wrong notion that Bamboo is inferior to timber in applications such as furniture and housing.

As we have seen the Bamboo sector can generate employment for all categories of people; unskilled, semi- skilled and skilled. It was anticipated that nearly 8.6 million new jobs would be created under the X Five Year Plan as part of the ambitious plans of the NBM to increase the acreage under Bamboo by 2 million ha. This would bring almost 5 million families above the poverty line. In the long run establishment of new industries can generate employment for 50 million people. While schemes like the NREGA have their justifications, we cannot afford to overlook this golden opportunity to provide sustainable employment to the rural poor.

Box 6

Andhra Pradesh Community Forest Management (APCFM) project was implemented by the Andhra Pradesh Forest Department (APFD), with funding support from the World Bank. 50,000 ha of degraded Bamboo forests were targeted for treatment. This target exceeded by 10%. It not only benefits the environment but community level manufacturing facilities (for incense sticks) generate 1 million man days/ annum With an annual turnover of Rs16 crore This activity fetches revenue of Rs 18,000 per tonne as against Rs 500 per tonne realized from pulp and paper mills

“Rawanpally VSS is fully into forest maintenance and conservation. “Wherever parts of the forest have been handed over to the villagers for conservation, they have developed a sense of ownership”

-Atram B Rao, Chairman Rawanpally VSS, Andhra Pradesh

“There are many young men like me here, who used to migrate to urban areas earlier in search of work. We would end up mostly underemployed or in worst case indulge in unlawful activities in desperation.”

-Arif, Employee CFC, Mancherial

“I now have a regular income, which she now earns from the security of her neighbourhood and her home, a life of dignity”

Muthamma, Vice Chairperson, VSS, Chinthapally Andhra Pradesh

7. ENVIRONMENT:

We cannot assess the worth of Bamboo as a resource for the economy without elucidating its exceptional value for the environment. Bamboo acts as a:

7.1. Atmospheric and Soil Purifier: Bamboo acts as an atmospheric purifier by reducing levels of Carbon Dioxide and generating more Oxygen than an equivalent strand of trees. It also lowers light intensity thus protecting against UV rays. Also Bamboo is known to bind soil very well, thus preventing soil erosion. Bamboo can be used for rehabilitation of degraded land, controlling landslides, floods, protection of sea banks, riverbanks, dam sites etc. It can be used in Watershed development programmes too.

7.2. As a Substitute for Wood: It is a versatile highly renewable natural resource. As opposed to trees, the commercially important species of Bamboo mature in 4-5 years and annual harvesting of Bamboo using sustainable methods is possible. It not only grows faster than trees, it also has a lower water requirement. It is known to survive in diverse soil and rainfall conditions. Thus as a substitute for wood it will help to mitigate the pressure on natural forests. New innovative Bamboo products can replace products made from non biodegradable material

7.3. As Food: Bamboo shoots the principal food item obtained from Bamboo has high nutritional value and anti toxicant properties. Bamboo is also used in traditional medicines. Its salience lies in its potential to provide nutritional security to the rural people.

7.4. As a Source of Energy: Bamboo is the foremost in Biomass production with up to 40 tonnes per hectare per year in terms of culms only in managed stands. Gasification of Bamboo also produces energy and useful by products, making it a clean and again highly renewable source of energy for the poor.

Box 7

Financial mechanisms have evolved to mitigate the adverse impacts of Climate Change in recent past. These mechanisms are project based and allowance based. Under the compliance structure of international carbon market, Clean Development Mechanism of the Kyoto Protocol is an attractive option for overcoming financial and other barriers of Climate Change mitigation project implementation in the developing countries. A comparatively small market is also evolving under the voluntary structure driven by the corporate social responsibility to offset emission footprints of activities, products and services of individuals and companies.

Having large Bamboo resource and potential of enhancing its cultivation and utilization, India has promising opportunities for Climate Change mitigation. These include-

1. Bamboo plantations

Sequestration occurs in Bamboo plantation thus Bamboo plantations serve as carbon stock due to their sink action

2. Bamboo as energy source: Bio-energy is considered to be GHG neutral and its use poses hardly any net radiative forcing to the atmosphere. Eligibility of these options has been assessed in the paper under the CDM and VCM (Voluntary carbon market) from the methodological aspects.

3. Bamboo products: Bamboo can be used as a replacement of building materials, and might reduce emissions associated with the production of baseline building material (e.g. concrete). Other products like furniture and household composites can replace conventional energy intensive products

Based on the assumptions from past studies it was estimated that the Bamboo and Bamboo application can generate 18 to 26 carbon credits per ha per year, offering the revenue of Rs5,578 to 10,078 per ha per year and even more in certain cases.

8. RECOMMENDATIONS

8.1. The Premise: I am going to begin by laying down the broad premise for my recommendations. The idea of a liberalized Bamboo sector essentially means allowing the forces of demand and supply to work freely. At the same time the state must play a positive role by undertaking market complementary interventions with objective of:

- (i) Incentivising Bamboo plantation and production of Bamboo products
- (ii) Removing informational deficiencies and asymmetries i.e. availability of off the shelf technology, information about prices which would reflect the demand and supply condition in a liberalized economy, making available relevant technical know how to tribal and other backward communities to help them upgrade their craft.
- (iii) Facilitating expansion of markets: India is aiming at capturing 27% of the world market for Bamboo products by 2015. Given the supply shortage existing even today this is obviously not possible without any changes in the present set up. There must be a conscious effort to promote new age Bamboo products and strengthen market for traditional products and also push Bamboo as a viable and environmentally friendly alternative to man made materials.

This will ensure that the Bamboo sector in India yields efficient outcomes which can be captured by higher productivity and the absence of demand-supply gaps. In fact the aim would be for domestic supply to exceed domestic demand by being competitive in the international market.

This however is not what constitutes a people friendly sector, the livelihood and environment concerns should be accorded primacy right from the beginning and not as an afterthought. In a modern market set up where contracts become the means of settlement between unequal parties for e.g. small growers and a large processing business house the need is for the government to provide a people friendly legal framework to ensure that these contracts are honoured and the growers are not given a raw deal. In the case of Tribal Artisan communities/ Forest dependent who would not be in a position to right away capitalise on market opportunities the government should undertake Research and Development activities to allow them to access markets, develop new products and introduce best practices. This is to ensure that the development in this sector is equitable; fortunately the nature of the Bamboo resource is such that in the newly emerging green economy it could well be the poor man's stave.

"Bamboo Sector has to be 'liberalised' and it should be treated as a plantation and Horticulture crop without any restriction on its movement and felling for commercial purposes"

"Bamboo is often called the 'Orphan' crop as in the Government no Department or Agency has taken up its potential in a holistic manner"

-Planning Commission, 2003

8.2. Policy Recommendation Matrix:

SUPPLY (government land)	DEMAND	POLICY AND LEGISLATION	LIVELIHOOD and ENVIRONMENT
<p>Resource Inventorization and Monitoring</p> <p>Sustainable Harvesting and Best Collection/Non Destructive Practices</p> <p>Training of JSS members</p> <p>Scientific Regeneration</p> <p>Handling the phenomena of gregarious flowering effectively</p>	<p>Promoting the use of Bamboo and Bamboo products in government infrastructure development and housing programs</p> <p>Product Specific Research and Development / Designing/ Range through design institutes</p> <p>Marketing Strategy: Branding, Certification and Standard codes</p>	<p>Amend 1927 Act</p> <p>Ministry of Environment and Forests should declare Bamboo a grass</p> <p>Bamboo to be clearly classified as NTFP and regulations in cutting, transport and use of Bamboo should be relaxed</p> <p>Orientation of People on Tribal Right Act in relation to NTFP harvesting and tenure rights</p> <p>Creation of a Bamboo Board</p>	<p>Integrating Bamboo based livelihood options into poverty alleviation programs that target SC/ST population like NREGA</p> <p>Rehabilitation of Plywood factories using Bamboo as raw material</p> <p>Expansion of Handicrafts and Cottage and tiny industry- Bamboo shoot production, <i>agarbattis</i> etc</p>

For private lands			
<p>Managed Plantations should be encouraged</p> <p>Suitable agro-forestry models developed</p> <p>Investment in infrastructure to attract private Investment</p> <p>Establish National Bamboo Institute</p>	<p>Promotional Campaign</p> <p>Market Information System</p> <p>Relaxation of Taxation policies</p> <p>Import Duty to be levied on imported pulp in the short run</p> <p>Credit made easily available for SMEs</p>	<p>Govt to declare it a horticulture crop</p> <p>Farm grown Bamboo trade and transit rules need to be abolished</p> <p>Include Bamboo as a Plantation crop wherever separate laws exist</p> <p>Remove land ceiling restrictions</p> <p>North East converted into Special Bamboo Zone</p>	<p>Bamboo to be included under JFM program and planted in degraded areas</p> <p>Explore Bamboo as a source of energy for rural Households</p> <p>Make Bamboo eligible for Carbon Credits</p> <p>Scientific Harvest Policy to apply to private producers as well</p>

References:

Hazra, A., November 2007, *Industrialisation of Bamboo Sector in India*, A Report by India Development Fund and Confederation of Indian Industry

Government of India, February 2003, *National Bamboo Mission on Bamboo Technology and Trade Development*, Planning Commission

Saxena N., Bahl K., August 2008, *Hollow Cylinder*, documentary, Top Quark Films

Bhattacharya P., *Pro-Poor Forestry Models of Major NTFPs (Tendu Leaves and Bamboo): Lessons of Success and Failure*, Research Paper, Indian Institute of Forest Management

Rawat J. K., Khanduri D.C. , *The Status Of Bamboo And Rattan In India*, Research Paper, Forest Research Institute Indi and Ministry of Environment & Forests India

Wang X. , June 2006, *Comparative Analysis and Policy Recommendations on Developing Bamboo Resource Tenure Systems in Asia and Africa*, Joint Project in Cooperation with INBAR and WFI

Kant S., *Institutions and Bamboo Production to Consumption System (A Comparative Study of China and India) Part II: India*, Faculty of Forestry, University of Toronto

Ranjan M. P., 1 February 1999, *FROM THE LAND TO THE PEOPLE: Bamboo as a Sustainable Human Development Resource for India*, A development initiative by the United Nations Development Programme (UNDP) and the Government of India

Ranjan M. P., *Bamboo and Rural Prosperity: Leveraging the Seedlings of Wealth*, Paper prepared for publication in the pre-conference souvenir for the World Bamboo Congress, New Delhi from 27th February to 4th March 2004,

Ranjan M. P., *Rethinking Bamboo in 2000 AD*, Paper presented at the GTZ/INBAR Workshop on Bamboo and Rattan 2000 from 12 to 21 April 2000 at Hainan and Yunnan Provinces of China

Haque M. S. *Bamboo for Ecological Security and Prosperity*, Research paper, NABARD, India

INBAR- CIBART Documentation Centre Bangalore, May 2006, *Agarbatti Stick Production*, The World Bank, Andhra Pradesh Forest Department, Vana Samrakshana Samithis

Van Der Lugt P., *The Bamboo Sector in Colombia and Ecuador: a state of the art analysis of opportunities and constraints*, *J. Bamboo and Rattan*, Vol. 4, No. 4, pp. 421–440 (2005)@ VSP 2005

Saxena N. C., *Policy and Legal Reforms
For The Poor in India*, Article, UNDP, New Delhi

Government of Mizoram, 2004, *Comprehensive Action Plan
For Bamboo Flowering And Famine
Combat Schemes (Baffacos)*, Planning & Programme Implementation Department, Government
of Mizoram

Government of Mizoram, 2007, *Achievement Reports
On Bamboo Flowering & Famine Combat Scheme (Baffacos) During 2004 – 05 & 2005– 06*,
Planning & Programme Implementation Department, Government Of Mizoram

All India Shippers Council, Oct 2001, *Study Report on Creating Corporate Success in the N.E.*

Government of India, Ministry of Agriculture, 2008, *One Year of National Bamboo Mission*, Cane
& Bamboo Technology Centre

Government of India, Ministry of Agriculture, *Achievement Report
2007 – 2008, National Bamboo Mission*, Bamboo Technical Support Group for Eastern India,
Cane and Bamboo Technology Centre

Government of India, Ministry of Agriculture, *Progress Report 2008-09 Till Jan. 2009* , *National
Bamboo Mission*, Bamboo Technical Support Group For Eastern India, Cane and Bamboo
Technology Centre

Government of India, Ministry of Agriculture, *Newsletter of Cane & Bamboo Technology Centre*,
April 2009, National Bamboo Mission,

Cane and Bamboo Technology Centre, *Annual Report 2007-08*
Government of India, Ministry Of Agriculture, National Bamboo Mission Brochure on Bamboo
Technology Support Group for East & North Eastern State

Government of India, 2007, *11th Five Year Plan, Chapter 3: Forests*, Planning Commission

Government of India, *Report of Working Group on Forests for the Eleventh Five Year Plan (2007-
2012)*, Planning Commission

Websites of Ministry of Environment and Forests (Section on Forest Laws)
National Bamboo Mission (various materials)
National Mission on Bamboo Applications
Cane and Bamboo Technology Centre
Government of Mizoram
Government of Kerala
International Network of Bamboo and Rattan

Sastry C. B., 2008, *A 2020 Vision for Bamboo in India, Opportunities & Challenges*, Paper presented at International Conference on Improvement of Bamboo Productivity and Marketing for Sustainable Livelihood 2008

Singh H. P., Ansari M. Y., Rawat A., Community based Market Information System (MIS) for Bamboo, Paper presented at International Conference on Improvement of Bamboo Productivity and Marketing for Sustainable Livelihood 2008, CTBC Proceedings

Bhattacharjee N. J., Chakravarthy K., Indian Bamboo Industry Market Overview & Outlook, Yes Bank, Paper presented at International Conference on Improvement of Bamboo Productivity and Marketing for Sustainable Livelihood 2008

Xingcui D., 2008, The Systematic Analysis on the Fast and Successful Development of Bamboo Industry in Zhejiang Province, China, Paper presented at International Conference on Improvement of Bamboo Productivity and Marketing for Sustainable Livelihood 2008, CTBC Proceedings

Salam K., April 2008, Bamboo for Economic Prosperity and Ecological Security with Special Reference to North East India, Paper presented at International Conference on Improvement of Bamboo Productivity and Marketing for Sustainable Livelihood 2008, CTBC Proceedings

Dube L. C., April 2008, Climate Change Mitigation Opportunities in Bamboo and Bamboo Applications, Paper presented at International Conference on Improvement of Bamboo Productivity and Marketing for Sustainable Livelihood 2008, CTBC Proceedings

Naugraiya M. N. Kasture J. and Nema S., April 2008, Socio-economic status of Bamboo Artisan's Communities in Chattisgarh, Paper presented at International Conference on Improvement of Bamboo Productivity and Marketing for Sustainable Livelihood 2008, CTBC Proceedings

Jalan M. M., April 2008, Revival of closed Plywood Factory in the North Eastern Region, Paper presented at International Conference on Improvement of Bamboo Productivity and Marketing for Sustainable Livelihood 2008, CTBC Proceedings

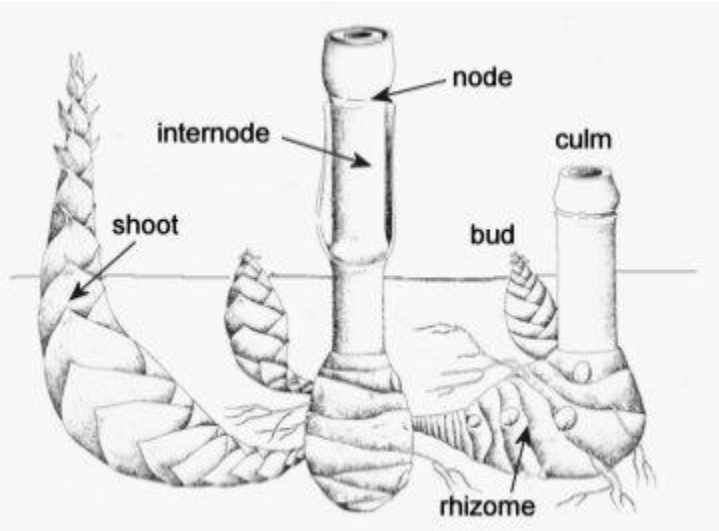
Sreenivasan R., Parthiban K. T., Vennila S., Rao M. G., April 2008, Contract Farming in Bamboo-Tamil Nadu Experience, Paper presented at International Conference on Improvement of Bamboo Productivity and Marketing for Sustainable Livelihood 2008, CTBC Proceedings

Jamir I. P., April 2008, Forest Policy and Laws Governing Cultivation, Harvesting, Transport and Trade of Bamboo in Nagaland, Paper presented at International Conference on Improvement of Bamboo Productivity and Marketing for Sustainable Livelihood 2008, CTBC Proceedings

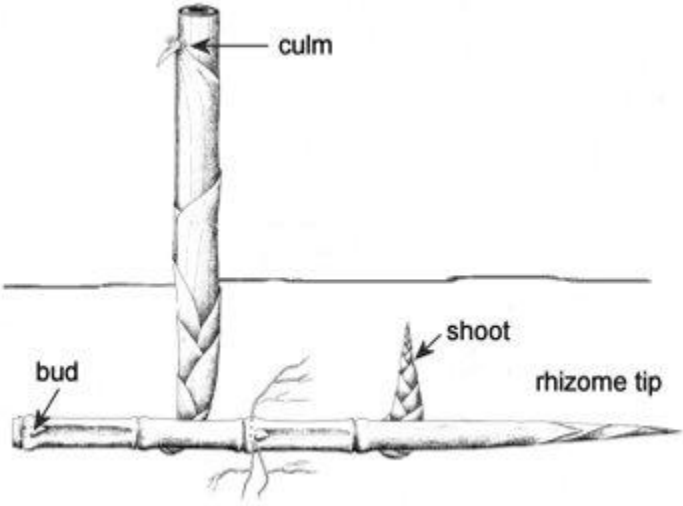
Manoharan T. M., Trivedi Babu N. V., April 2008, Forest Policy and Laws Governing Cultivation, Harvesting, Transport and Trade of Bamboo in Kerala, Paper presented at International

Conference on Improvement of Bamboo Productivity and Marketing for Sustainable Livelihood 2008, CTBC Proceedings
Deshmukh S. V., April 2008, Bamboo based Livelihoods: The Maharashtra Model, Paper presented at International Conference on Improvement of Bamboo Productivity and Marketing for Sustainable Livelihood 2008, CTBC Proceedings

Annexure 1: Clump and Non Clump Forming Bamboo



1.1. Clump Forming Bamboo



1.2. Non- Clump Forming Bamboo

Annexure 2: Market channels of Bamboo and constraints

Name of the states	Market channels	Mode of marketing	Constraints experienced in marketing
Himachal Pradesh	Depots of HPSFC	Open auction	Lack of proper competition, buyers are mostly people from same place. Bamboo reaches market after Diwali when prices are low.
Karnataka	Forest Department Sale	Sold from Forest Depots.	Transport and decay during storage.
Kerala	Kerala State Forest Department	Sold from Forest Depots.	Fluctuation in rates of raw material.
Madhya Pradesh	Paper Mill, Industries, SC/ST Corporation. Open market (commercial Bamboo)	Agreement with the Forest Department and direct purchase from the private growers.	-
Maharashtra	Bamboo sale is periodically done in open auctions held at various Govt. Depots.	Traders purchase Bamboo from the auctions and sale them in open market.	The prices of Bamboo are modulated by the timber associations.
Pondicherry (UT)	Private merchant, cooperative society.	Wholesale and Retail.	Storage of Bamboo, transportation, seasonal changes in rates of raw material.

Tamil Nadu	Retail outlets. Wholesale dealers through cooperative society, sericulture department	Domestic and industries.	Fluctuation and variations in price from season to season and place to place. Lack of transport facilities and shortage of raw material.
<u>West Bengal</u>	Building construction Companies Household use Paper pulp Companies Handicrafts Companies/individuals	Contract and bargaining. Contract and bargaining. Local purchase. Local purchase and bargaining. (Producer to middle men to retailer to purchaser).	Small and diffused markets. Due to poverty of the grower, the latter suffers most. Communication gap between the producer and seller.

Annexure 3: Customary and Traditional Rights in Select States

These customary and traditional rights and their regulation in some of the states, as compiled by Singhal and Gangopadhyay (1999), are given below:

Madhya Pradesh: The villagers are supplied up to 250 pieces of Bamboo per family per year at a subsidised rate of Rs0.25 per Bamboo from the *nistar* depots. These depots are located in the middle of cluster of villages. *Bansods*, the artisan community earning their livelihood through manufacture of Bamboo articles, get up to 1,500 pieces of Bamboo per family per year at concessional rates of Rs0.60 per piece for the first 500 pieces and Rs0.75 per piece for subsequent pieces.

Maharashtra: Bamboo is supplied at concessional rates to the agriculturist and basket and mat makers, either from the forest coupe under working or from the departmental depots after extraction.

Orissa: Depending on availability, each rural family is supplied 250 Bamboos and each *bansod* family 1,500 Bamboos per year. The allotment is done by the state forest department on a certificate from the Head Man of the village. At the time of flood or cyclones, 50 Bamboos are provided to each affected family.

West Bengal: Forest Protection Committees, established under the Joint Forest Management, which help the forest department in protection and rejuvenation of the forests are given 25% of the net sales proceeds of the usufructs.

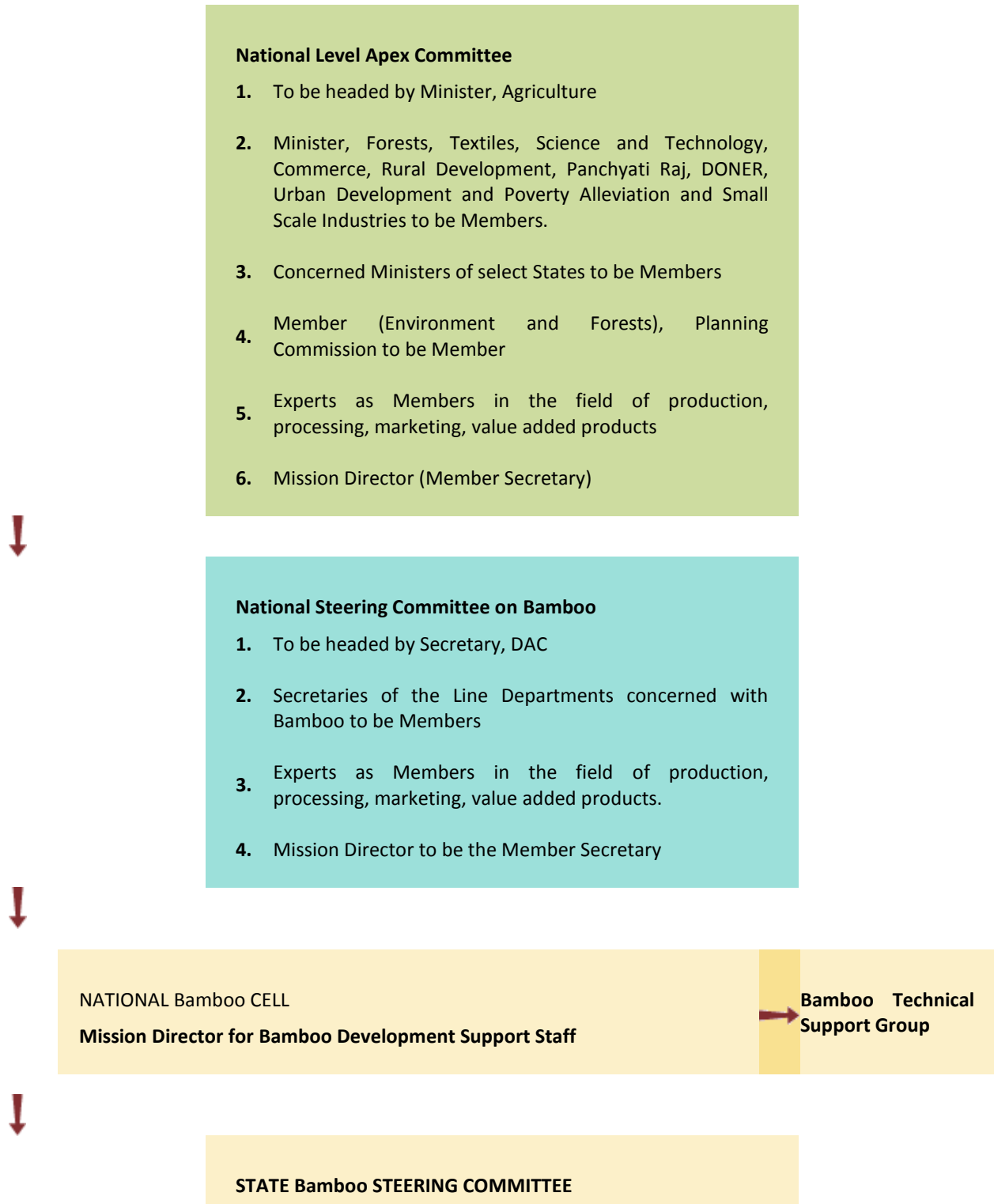
Himachal Pradesh: The local population has the right to meet their bonafide requirements from the Bamboo bearing forest compartment. For those residents whose requirements can not be met from these compartments conveniently, Bamboo supply is made from forests other than the closed ones.

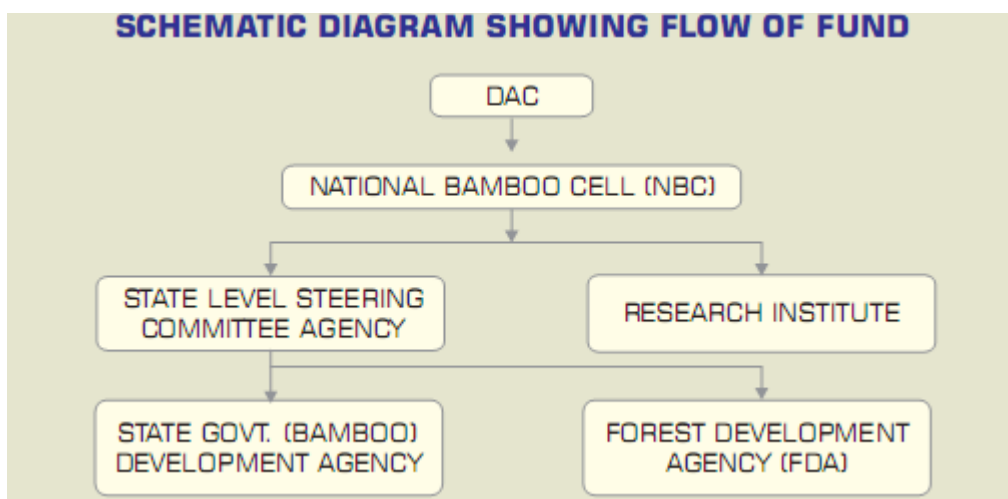
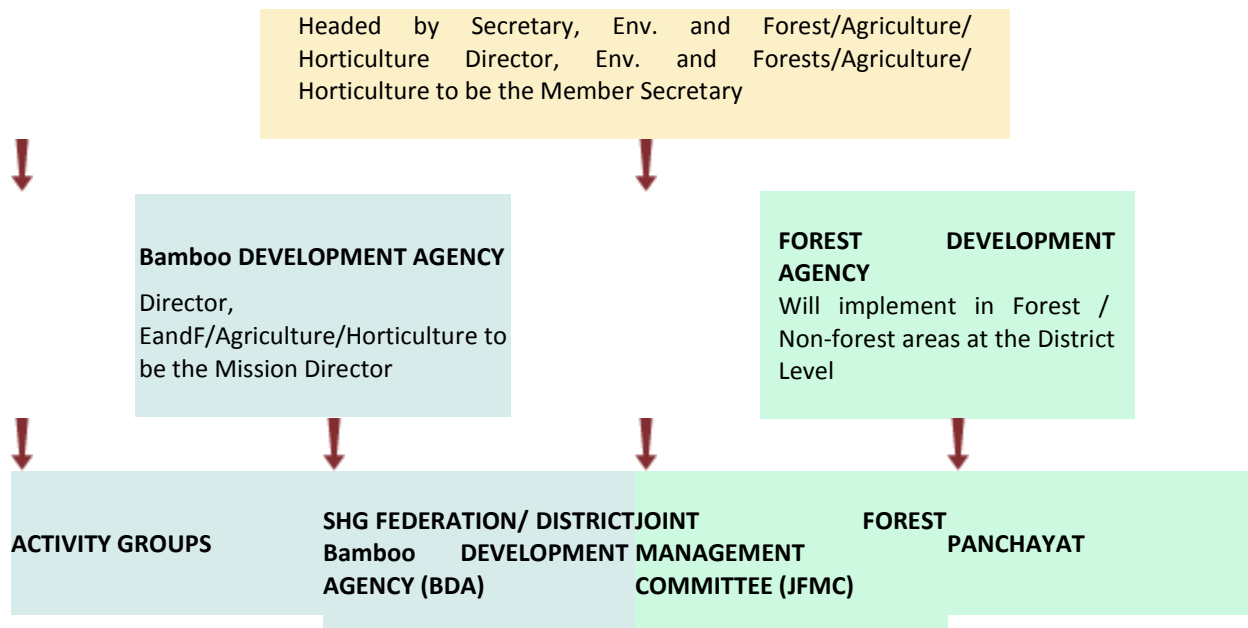
Andhra Pradesh and Karnataka: People in and around forest enjoy the privilege of free use of Bamboo for fencing, agricultural requirements, hutment and other bonafide uses.

Uttar Pradesh: Bamboo is made available to the villagers for their domestic and agricultural demands provided they have been enjoying this privilege for long and their livelihood depends on it. The supply is made at reasonable rates, but not less than the schedule rates fixed by the forest department.

Tripura: As per rules framed in 1952, the population engaged in shifting cultivation (about 20,000) was entitled to Bamboo collection free of cost for construction of their huts and other uses. In addition, bonafide householders and cultivators from the villages adjoining reserved forests were also entitled to free permit to the extent of 250 pieces of Bamboo per family per year. Royalty for making Bamboo baskets, mats, etc. has been discontinued since 1990 as a concession to the Bamboo craftsmen.

Annexure 4: Indicative Structure of National Bamboo Mission and Tea Board





OVERALL TARGETS UNDER NATIONAL BAMBOO MISSION

S.No	Programmes	X Plan	XI Plan	Total
1.	Area Expansion			
	a) Forest Area	16,000 ha.	72,000 ha.	88,000 ha.
	b) Non-Forest Area	16,000 ha.	72,000 ha.	88,000 ha.
2.	Nurseries - Centralized	160 nos	185nos	345 nos
	a) Kisan	50 nos	30 nos	80 nos
	b) Mahila	50 nos	30 nos	80 nos
3.	Improvement of Existing Stock	7,500ha.	28,500 ha.	36,000 ha.
4.	Tissue Culture Units	1 nos	2 nos	3 nos.
5.	Bamboo Bezaars	71 nos.	124 nos.	195 nos.
6.	Retail Outlets (Show-Rooms) in 10 Metropolitan cities	3 nos	7 nos	10 nos

