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ECONOMIC VIABILITY OF BAMBOO IN ARUNACHAL PRADESH

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Bamboos play an important role in the rural economy of Arunachal Pradesh. World-wide, bamboo is slowly but steadily gaining importance as material for sustainable development. Bamboos are a sub family of grasses that include over 1,200 species worldwide. India is the second largest producer of bamboo in the world, next to China, and also has the richest bamboo diversity in the world with 23 genera and 125 indigenous as well as exotic species. In North Eastern India, the diversity of bamboo is very high where about 19 genera and 78 species occur. 26 species belonging to 9 genera occur in Arunachal Pradesh. Bamboo plays a vital role in livelihood security in terms of poverty alleviation, ecology, security through conservation, and providing food and shelter. Bamboo shoots are also popularly consumed preparing different delicious food indigenously. In addition to the other vegetables, the local people use shoot of bamboo in almost all menus of dishes. The commercial aspect of the bamboo resource is also very high and it is fast emerging as the most viable wood alternative in the world over and can be effectively used to revive the closed down plywood units of the state. Arunachal Pradesh has a rich tradition of Bamboo and Cane Handicrafts. The products reflect the rich and varied culture of the tribes inhabiting this enchanting State and the products featured are representative of the wide range of Handicrafts produced in the State.

Key words: *bamboo diversity, North Eastern India, Species, Genera, Bamboo shoots, Commercial aspect.*

INTRODUCTION

Arunachal Pradesh, formed on February 20, 1987 is the 13th geographically largest State. It has 83,743 Sq. km. area covering around 2.5% of the total geographical area and bearing only 0.11 per cent of the population of the country with population density 17 per sq. kilometer as per 2011 census. The State is predominantly mountainous and like a horseshoe in shape. This State is situated near the tropic of cancer, lying between latitudes 26°28′N and 29°30' N and longitude between 9°30' E and 97°30' E on the North-East extremity of India. It is bestowed by nature with the beautiful range of snow-clad Himalayan peaks which is locally called as paradise on the earth as a result of its enormous ecological and floristic diversity. The State is bounded on the North, North-East and North-West by China, on the South by Assam and

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Nagaland states, on the South-East by Myanmar, and on the West by Bhutan. The land and topography of the state is hilly, beginning from foothills to snow-clad zones of alpine region. The elevation of the hills ranges from 150 metres to over 7,300 metres. Topographically the plains and foothills cover about 10-15%, broad valleys and plateaus about 35%, steep slopes 35%, snow-clad peaks and pastoral land 18–20%. The state represents beautiful scenery with irregular mountainous topography.

In North Eastern India, the diversity of bamboo is very high where about 19 genera and 78 species occur (Hore, 1998). The region shows a strong base and culture of use of bamboo resources. There exists a wealth of indigenous knowledge on utilization and management of bamboo which goes side by side with its traditional use. Arunachal Pradesh has an area of 7770 sq. km under bamboo cover and is richest in the country as far as the bamboo resources are concerned (Bhuyan et al., 2007). 26 species belonging to 9 genera occur in Arunachal Pradesh, such as Bambusa (4 species), Chimono Calamus (2 species), Dendro-calamus (6 species), Dinochloa (1 species), Drepano-stachyum (1 species), Gigantochola (1 species), Neomicro Calamus (1 species), Phyllostachys (3 species) and Schizostachyum (7 species) (Source: BSI, Itanagar). Bamboos play an important role in the rural economy. They are widely distributed and occur abundantly in most regions of India except in the Rajasthan desert or upper reaches of Kashmir. In addition to the bamboo based industry, we can use tender bamboo as food in the form of bamboo shoots. In addition to the domestic demand, there is large scale demand in the international market. Due to high utility of bamboo, it is closely interwoven with the life of the people; it is known as the "Poor man's timber", "Green gold of the forest" and "Friend of the people. World-wide, bamboo is slowly but steadily gaining importance as material for sustainable development. Bamboos are a sub-family of grasses that include over 1,200 species worldwide. India is the second largest producer of bamboo in the world next to China and also has the richest bamboo diversity in the world with 23 genera and 125 indigenous as well as exotic species (Verma and Bahadur, 1980).

The National Mission for Bamboo Applications (NMBA) is an initiative of the Department of Science & Technology (DST), Government of India, and is being implemented by the Technology Information, Forecasting & Assessment Council (TIFAC), an autonomous organisation under DST. TIFAC brings to this endeavour a decade and more of experience in key areas of economy covering various societal initiatives. TIFAC brings to the bamboo sector its unique mission-mode modality, a tested and successful mechanism to bridge the laboratory-user-market gap, one that helps implement industrial technologies speedily. Focusing on applications and markets, sourcing

knowledge and technology from diverse resources and working intensively with its partners, TIFAC has developed innovative models of technology absorption, development & dissemination.

The Mission takes a multi-disciplinary and multi-dimensional approach to:

- Develop and promote environment friendly, value-added bamboo based products, practices, technology & processes
- Improve industry-lab-user linkages
- Develop and disseminate technologies for value added products
- Develop small & medium enterprises
- Empower people and communities by focusing on areas and regions with natural competitive and comparative advantages.

NMBA endeavours to achieve its goals by focusing on the industrial growth of the bamboo sector by functioning as:

- A funder of industrial initiatives
- A catalyst and demonstrator of technologies & processes.
- A platform for exchange of ideas and a repository of sectoral knowledge.
- A facilitator and promoter, and
- In pivotal & limited areas as an implementer

Arunachal Pradesh occupies an important position among the bamboo bearing states of India. Bamboo forms a major constituent of the forest vegetation of Arunachal Pradesh. Tropical, subtropical and temperate species are found well distributed in the State.

In Arunachal Pradesh, which has about 46 bamboo species, the bamboo flora is seen up to an elevation of 2000 m or even more. District-wise distribution of bamboo in Arunachal Pradesh is shown in Table 1.

STATE BAMBOO MISSION

Ministry of Agriculture, Government of India launched National Bamboo Mission in 2006 for development of bamboo as resource for economic development. Following this, the government of Arunachal Pradesh has also started State Bamboo Mission and made institutional arrangements for development of bamboo as a resource. State Bamboo Steering Committee, Bamboo Development Agency and District Level Agency on Bamboo have already been constituted. The State Bamboo Steering Committee is headed by

Table 1
District wise Distribution of Bamboo in Arunachal Pradesh

Name of the species	*Distribution*
Arundinaria gracilis	West Kameng
A. maling	West Kameng
A. racemosa	West Kameng
Bambusa balcooa	Tirap, Changlang, Lohit, D. valley, East Siang, West Siang, Lower Subansiri, Papum Pare, West Kameng, East Kameng.
B. longispiculata	West Siang
B. multiplex	East Siang
B. nutans	Tirap, Lohit, D. valley, East Siang, West Siang, Lower Subansiri, Papum Pare West Kameng, East Kameng.
B. pallida	Tirap, Lohit, D. valley, East Siang, West Siang, Lower Subansiri, Papum Pare West Kameng, East Kameng.
B. polymorpha	Lower Subansiri.
B. tulda	Tirap, Changlang, Lohit, D. valley, Upper Siang, East Siang, West Siang, Lower Subansiri, Papum Pare, West Kameng, East Kameng.
B. vulgaris	Papum Pare
B. wamin	Papum Pare
Chimonobambusa callosa	Lohit, Dibang valley, Upper Subansiri, West Kameng, Tawang.
Dendrocalamus giganteus	Lohit, Upper Subansiri.
D. hamiltonii	Tirap, Changlang, Lohit, D. valley, Upper Siang, East Siang, West Siang, Lower Subansiri, Papum Pare, West Kameng, East Kameng
D. hookerii	Papum Pare
D. patellaris	Papum Pare
D. sahnii	Lower Subansiri
D. sikkimensis	West Kameng
Gigantochloa albociliata	Lohit, Papum Pare.
Melocanna baccifera	Tirap.
Phyllostachys baccifera	Lohit, Dibang valley, Lower Subansiri, Papum Pare, West Kameng.
P. assamica	Upper Subansiri
P. manii	Upper Subansiri
Pleioblastus simonii	Lower Subansiri
Schizostachyum arunachalensis	West Siang
S. fuchsianum	Lohit, Dibang valley, West Siang
S. helferii	
S. latifolium	Lohit, West Kameng.

contd. table 1

Name of the species	*Distribution*
S. pallidum	West Kameng
S. pergracile	Lohit, Papum Pare.
S. polymorphum	Lohit, Papum Pare.
Sinarundinaria elegans	West Kameng
S. griffithiana	Tawang
S. hirsuta	Lohit, West Kameng, Tawang.
S. hookeriana	West Kameng.
S. intermedia	West Kameng, Tawang.
S. pantlingii	Lohit, West Kameng.
S. suberecta	Tawang.
Thamnocalamus aristatus	Lohit, Tawang.
Thyrostachys oliverii	Tirap, Papum Pare.
T. regia	Papum Pare.

*Source:*Dept. of Forest, Itanagar, Govt, Arunachal Pradesh

PCCF and Principal Secretary (Environment and Forests) while, Director of State Forest Research Institute (SFRI) acts as its Member Secretary. Bamboo Development Agency and District Level Agency on Bamboo are headed by Director of Horticulture and District Horticulture Officer. State Bamboo Technical Support Group headed by Director, SFRI has also been constituted with officers, scientists belonging to the departments of Environment and Forests, Horticulture and Panchayati Raj.

National Bamboo Mission Scheme had been included in the 11th Five Year Plan of the Government of India. Action Plan under National Bamboo Mission is prepared under the supervision of State Bamboo Steering Committee (SBSC). The action plan is implemented in the state in forest areas by the Department of Environment and Forests in various forest divisions through Forest Development Agency (FDA). FDA has to function through Village Forest Management Committees (VFMCs). Scheme of National Bamboo Mission is implemented in forest areas in Joint Forest Management mode. The Departments of Horticulture and Panchayati Raj have implemented the National Bamboo Mission Scheme in non-forest areas through individual Entrepreneurs, Non-governmental Organizations and SHGs.

For development of bamboo as enterprise, the State government has constituted Arunachal Pradesh Bamboo Development Agency (APBDA). This Agency is presently headed by Shri Tame Phassang with Director, SFRI as its Member Secretary. It also includes senior officials and prominent industrialists as members. APBDA is planning to revive closed wood-based industries by

converting them into bamboo based industrial units. It is being supported by State government, National Mission on Bamboo Application (NMBA), Cane and Bamboo Technology Centre (CBTC) and State Forest Research Institute (SFRI) (SFRI Information Bulletin No.27). The motto under the NBM was to bring an area of 1,76,000 hectares under bamboo cultiva-tion during the 10th & 11th Five Year Plan in both forest and non forest areas of land. Under this mission, it was pro-posed to generate employment of 9.7 lakh man-days through nurs-ery and plantation activity.

The main objectives of National Bam-boo Mission are:

- To promote the growth of the bamboo sector through an area based region-ally differentiated strategy;
- To increase the coverage of area under bamboo in potential areas, with im-proved varieties to enhance yields;
- To promote marketing of bamboo and bamboo-based handicrafts;
- To promote, develop and disseminate technologies through a seamless blend of traditional wisdom and modern sci-entific knowledge.
- To generate employment opportunities for skilled and unskilled persons, espe-cially unemployed youths.

According to the Coordinator, state ac-tivities relating to National Bamboo Mission will be implemented through the respective Bamboo Development Agencies/Forest Development Agencies or any other agencies approved by the respective State Governments. The fund ear-marked for the year 2006-07, as approved by the National Level Steering Committee have been released to the respective states, and alto-gether, an amount of Rs. 6570.98 lakhs has been released to eight North-Eastern States under NBM. The details about the National Bamboo Development Agencies may be obtained from the respective State bamboo Mission Director or bamboo Development Agencies/Forest Develop-ment Agencies.

Bamboo can be used as charcoal and even some countries are trying to extract fuel from bamboo. A Bangalore based firm has come up with a model that can generate electricity from Bamboo. The model called bamboo based biomass gasification system was displayed at the first-ever Enterprise show organized by the Confederation of Indian Industries at the Assam Engineering College Ground, Chandmari, Guwahati. The model was developed by the Indian Institute of Science, Bangalore and demonstrated by the Department of Energy, Tezpur University (Times of India). Government of India is planning to confer more rights to the tribal in their own land, especially in hills, in the

next session of parliament by the department of Tribal Affairs. This should include scientific utilization of forest resources for Economic Development of all states in general and Arunachal Pradesh in particular (Arunachal Review, Vol.VIII, No.22, June-August, 2007 P.31). Thus, bamboo plays a vital role in livelihood security in terms of poverty alleviation, ecology, security through conservation, and providing food and shelter.

Utilization of Tender Bamboo as Food

Bambusa tulda and B. pallida were popularly cultivated species to meet their daily requirement. They made a lot of bamboo products for their own use as well as for selling in the market. Some of the people are also engaged in selling of bamboo culms to earn money. Bamboo shoots are also popularly consumed preparing different delicious food indigenously (Prodip et al. 2010). In addition to the other vegetables, the local people make shoot of bamboo and use it in almost all dishes. They also preserve the shoot and use it throughout the year and more or less consume every day. Fresh bamboo shoots are collected during June- September. A lot of bamboo species has been utilized by the tribal people of Arunachal Pradesh. They collect bamboo culms from forest as well as from cultivated plantation.

BAMBOO SHOOTS PROCESSING

Training workshop and demonstration for cluster /community level bamboo shoot processing carried out in Lohit district (Namsai) of the State in June 2006.

- Shoots of Bamboo have nutritious value and are tasty to eat. The shoots are crisp and tender, comparable to asparagus and have a flavour similar to corn. Most of the Arunachalee relish bamboo shoot named locally Bamboo Tenga. They preserve it and use as an ingredient of vegetable menu almost daily.
- Shoots are found at the base of bamboo clumps and are normally extracted in the monsoon months when the bamboo is two weeks old or one-foot tall. Farmers are familiar with its harvesting techniques.
- Bamboo shoots are part of the traditional cuisine in South East Asia and other parts of the world, including India. Pickles made of bamboo shoots are commonly used in households in the north and the north-east region where they are also used as a main ingredient in different meat and fish preparations as curry or dry dish.

- In recent times, urban India has begun to discover the shoot as a culinary delight. Cuisine of different origins such as Chinese, Thai, Japanese, Korean, Malaysian and Mexican served in restaurants utilise them as a speciality item.
- Bamboo shoots can be consumed in many ways – as a salad or fried, as a vegetable or for soups. They can also be offered as dry, marinated and sautéed products. With people becoming health conscious and shoots being low on fat and high on fibre, vast possibilities of usage can be addressed.

North-East India is well placed to grow bamboo and establish shoot manufacturing facilities that can cater to the increasing needs of the oriental food market for domestic and export markets. The Table-2 below highlights the bamboo species that yield good edible shoots.

Table 2
Bamboo Species That Yield Good Edible Shoots

	North-Eastern States						
Variety	*Arunachal Pradesh*	*Assam*	*Manipur*	*Meghalaya*	*Mizoram*	*Nagaland*	*Tripura*
Bambusa nutans	✓	✓	✓	✓		✓	✓
Bambusa pallida	✓	✓	✓	✓		✓	✓
Bambusa polymorpha	✓	✓	✓	✓			✓
Bambusa tulda	✓	✓	✓	✓	✓	✓	✓
Dendrocalamus brandisii			✓				
D. giganteus	✓	✓	✓	✓	✓	✓	
D. hamiltonii	✓	✓	✓	✓	✓	✓	✓
D. strictus		✓		✓	✓		✓
Meloccana bambusoides/ (Meloccana baccifera)	✓	✓	✓	✓	✓	✓	✓

Source: Dept. of Forest, Itanagar, Govt, Arunachal Pradesh

The sourcing of material is very critical to meet the qualitative and quantitative aspects of production. Bamboos for shoots should be grown in a planned manner with good silviculture practices, preferably with community involvement, as it makes the task of cultivation more manageable and economical.

The Market for Shoots Exists as a Three-Tiered Structure

The local market is at the first tier and at the low end of the value chain with the shoots being sold fresh as a vegetable for consumption by local communities.

The second tier comprises metro and urban markets within the country procuring the shoots through an established distribution chain in a packaged form primarily for oriental cooking needs.

The third tier is the export market that will yield best value for the produce but will have stringent requirements of quality and taste.

Entrepreneurs looking to enter the bamboo shoot sector should target marketing efforts towards the second tier, that of the national domestic market, and then move up to the third tier, the larger export market, once they are confident about addressing aspects of consistent quality and quantity supply. Smaller manufacturers could target local markets which in consumptive regions can offer reasonably high volumes.

The Department of Agriculture & Co-operation, Ministry of Agriculture, Govt. of India has recently launched a centrally sponsored scheme "National Bamboo Mission" (NBM) for addressing the issues relating to the develop-ment of bamboo in the country. The cost of the Mission is estimated at Rs. 5.68 billion with 100% assistance of the Central Government. The Scheme will be implemented by the division of Horticulture under the Department of Agriculture and Cooperation in the Ministry of Agriculture, New Delhi, informed B.J. Lhungdim, Coordina-tor, Cane and Bamboo Technology Centre, Guwahati.

Wood Substitutes and Composites

A formerly closed plywood unit (Arunachal Plywood Industries Limited) at Namsai has re-entered production with a range of bamboo composite material and pre-fabricated structures, cladding material & panels in production, using new processes developed with technical support from NMBA, involving flattened bamboo and being utilized for pre-fabricated structures. Flattened bamboo is being used as a constructional substitute for woven mat. Primary processing machinery for flattened bamboo, developed partly at APIL Namsai, and subsequently developed with a machinery manufacturer at Kolkata (Dhanjal Enterprises) is fabricated and being utilized. Ancillary cluster units are being set up with this machinery – one has gone into production at Namsai. In November, production reached 100 sheets (16 mm) per day, and in May 2006, to 300 sheets a day. Pre-fabricated structures utilizing bamboo composite material (less roofing) are also being prepared at Namsai. Pallets and withering troughs for tea industry have been prototyped, and commercialized. Usage of bamboo/ composite material for bamboo pallets has been investigated as substitute for present wooden pallets used by the Tea industry (ICD Amingaon). Technical support is provided by NMBA and support for testing through CIPET Changsari.

Expansion and modernization of an existing ply unit has been taken up (Arunachal Agro Bamboo Products, Chowkham) to manufacture bamboo plywood. The company is presently operating at a small scale of 40-50 boards of bamboo mats per day. The proposed expansion and modernization plan would induct required bamboo processing machineries and technology for flattened bamboo board (with or without bamboo on mat) and would increase the capacity of production of unit to viable scale of 200 boards (12mm)/ day. Slated for induction are 1200 ton hot press, scissor lift, 4 drying chambers, glue spreader, DD saw, steam boiler (thermax) and primary processing machinery (inner and outer knot removers, hydraulic splitter, flattening machines and two side planning machines. For finishing and waste utilization, edge cutting machines, belt sander and a briquetting machine will be acquired.

Propagation and Cultivation

- Standardization of vegetative propagation and planting methods for Phyllostachys pubescens with SFRI, Itanagar in Arunachal Pradesh at Yachuli has not been entirely successful (propagation success ratio of only 30%). Stage- I activities like recording of morphometric parameters from the existing plot were completed. A green house with green agro shade net and 2 mist chambers with white silpaulin were constructed at Yachuli. Rhizomes planted during March-July had severe mortality; plantlets survival rate was better from August, 2004. The project has since been modified to establish a 10 hectare demonstrative plantation with the plant material from IHBT Palampur.
- Production of vegetative propagated plant material of Bambusa bambos (thorny bamboo) carried out at SFRI Chessa. Large quantities lifted by IV Corps, Indian Army for perimeter fencing requirements.
- Establishment of clump & productivity data (including bamboo shoots– extent and pattern of shooting) for select bamboo species was taken up with SFRI, Itanagar and data was obtained for commercially significant species.
- A Vegetative Propagation Centre has been established at Lathao in Lohit district.

HANDICRAFTS OF CANE & BAMBOO

The life of the people of this state is also intricately woven around the forest especially bamboo, canes and their products and thus one cannot imagine rural life without the use of these species (Sarkar & Sundriyal, 2002). The commercial aspect of the bamboo resource is also very high and it is fast

emerging as the most viable wood alternative in the world over and can be effectively used to revive the closed down plywood units of the state. To make such products, bulk of the supplies of bamboo is collected from the forest freely and from species cultivated in their own selected plots. Bamboo plays an important role in the socio-economic development of the indigenous communities. People raise large quantities of bamboo in and around their homesteads as well as rice fields. In many parts of the State, it is used as a food, fodder, primary construction material and for making variety of useful items. Traditional construction techniques of use of bamboo in flooring, roofing, as post and beam, and also in the false ceiling and fencing remain largely undocumented (Sundriyal et al., 2002). Arunachal Pradesh has a rich tradition of bamboo and cane handicrafts. The products reflect the rich and varied culture of the tribes inhabiting this enchanting State and the products featured are representative of the wide range of handicrafts produced in the State. The Department of Textile & Handicraft(s) has been set-up to develop this sector to uplift the economic condition as well as to provide self employment opportunity to the weavers and artisans of the State through various Development Schemes/Projects. The different handicrafts items made of cane and bamboo are shown in below in Table 3.

The most commonly objects made of cane and bamboo are baskets for storing and carrying paddy, fuel and water, vessels for preparing local liquor, rice plates, bows and arrows, headgear, mats, shoulder bags, etc. Ornaments and necklaces made of fine strips of bamboo and grass are also popular. Burnt

Table 3
Some Handicrafts Items Made of Cane and Bamboo

Source:www.ignca.nic.in/craft151.htm

pokerwork too is executed on bamboo articles. The Bangnis, Apatanis, Hill Miris and Adis are expert workers in cane and bamboo. They make beautiful baskets, bags, hats and even jewellery that speak eloquently of their skill. The Monpas and Sherdukpens do make use of bamboo but not to the extent as in other cultural areas. Bamboo is used for basketry. Basket making is a major craft in these areas. They produce baskets, grain holders, rice beer containers, haversacks, food plates, etc. from bamboo. Dyed cane or bamboo strips generally used for various items of dress are instead woven into a basket. Among the Apatanis, dyed cane strips are used for making a kind of waistband locally known as awoo. The Nyishis dye bamboo strips in black and are specially used for making hand fans. The Noctes and the Wanchos mostly use dyed cane strips for their headgear, waistband, headband, armlet, etc. Sometimes dancers' baskets used in dancing are also decorated with a limited number of dyed strips. Colours used in dyeing are limited. The most common dye are red, black and yellow. The Apatani waistband is dyed red. The Wancho and the Nocte headgears are invariably woven of red cane strips. Yellow and black colours are occasionally noticed. The Monpas, however, paint their strips in a variety of colours of which red, pink, brown, yellow, green and blue are common. Besides, varieties of blended colours are also noticed. The Nyishis and the Bangnis dye bamboo strips black for their hand fans. In Arunachal Pradesh, the dyeing material is vegetal substance. Some important handicraft items are also shown again in Table-4 below.

Table 4
Some Handicraft Items

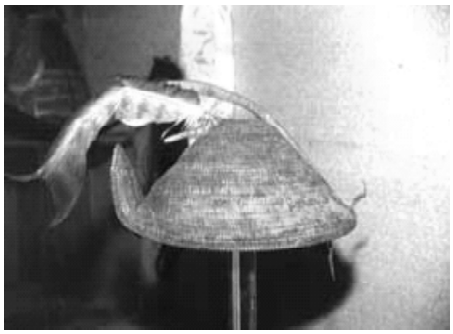
Bamboo Bottle

Bolup

Bolup: The bolup is a hat used by the Galo tribe of Arunachal. It is made by coiling lengths of cane to obtain a semi-elliptical bowl with a horizontal boat-shaped rim. The hat is extremely sturdy. A similar construction is used in hats made by other tribes. The form and decorative elements vary, but the basic structure is similar. In some cases, there are thick strips of cane that are tied onto the head as extra protection. In other hats, dyed wool or feathers are used as decorative elements.

Hat, Mishmi Tribe

Cane Hat, Idu Mishmi Tribe



Yatee: Cap of Apatani Tribe

The Yatee is made in two parts, held together by long loops of twisted bamboo rope. The top part is rectangular. The second part is a flat rectangular piece that shields the back. Both parts have braided bamboo straps that rest on the forehead. When the top part is not required, it is pushed back to hang suspended from the back shield by two long loops of twisted bamboo rope. Both parts are made with two layers of an open-hexagonal weave, sandwiching a layer of leaves between them. All the edges are held between two half splits of cane tightly bound together.

Bopa: Hat (Hornbill, Hair & Cane), Adi Tribe

The Apatani and Nyishi tribes use coiled hats that fit close on to the head like a skull cap. The bopa is slightly conical in shape. These hats are decorated with twisted cane ropes, and a hornbill beak that is dyed red.

Bamboo Basket

Classification of Basketry: Considering function, i.e. the utility as the basis, the whole range of basketry taken into consideration, can be conveniently classified into the following broad divisions: 1. Carrying basket, 2. Storage basket, 3. Receptacle4. Straining basket, 5. Decorative basket, 6. Fishing basket

Apatani Bamboo Comb: The Apatanis and Nyishis use combs carved out of a single piece of bamboo. A wide chip of a fairly thin walled bamboo is used. The combs have coarse widely-spaced teeth on one side and thinner closely-spaced teeth on the other. A part of the nodal ring separates the two sets of teeth. The internal nodal ring is cut flat on the inside of the comb, and the outside ridge is retained as a decorative element. These combs are functional as well as decorative.

Sudhum: The Apatani smoking pipe is called sudhum. The bowl is made from a cane called tarre while the stem is made from the reed bamboo called pepu. The hollow of the bowl is created by burning, to remove the soft pulpy centre of the cane. A similar pipe is made by the Apatanis where the bowl is made from bamboo. The Nyishi tribe of Subansiri District in Arunachal makes a pipe similar to the Apatani one, which is called hutusilli.

Socio-Economic Significance: Bamboo work constitutes the major cottage industry in Arunachal Pradesh. Due to lack of private sector, people are enjoying immense leisure time by menfolk, during which they practice handicrafts work. All the religious structures such as altars, effigies, etc are constructed for performance of religious ceremonies and rituals are made of and decorated with objects of basketry technique. Effigies representing deities and spirits found among the Apatanis, Nyishis, Adis are made of split bamboo in basketwork.

CONCLUSION

The bamboo in regard of food, handicrafts, houses, festivals, etc. stands at the root of lives of tribal people in the rural areas of the state. The handicrafts based on bamboo occupy a unique position in the rural economy of the state by not only contributing substantially towards strengthening the economic base but also by effective utilization of the vast natural resources untapped hitherto and the significant manpower. **The future is bright with lot of hope and scope for extending this tribal craft to reach throughout the country.** The State Government may give special attention for the growth of bamboo. But the role of the Government in facilitating the bamboo related workshop is insignificant.

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