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Traditional skill among the *Adi* tribes of Arunachal Pradesh

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The tribal people living in far flung areas dependent on rich biocultural resources have always been curious in exploring the plant resources of their immediate surrounding in order to sustain their traditional livelihood system. After centuries of being in close association with nature, they have developed for themselves the indigenous skill and technology to use these resources in various parts of their life support system. In recent decades, rapid modernization and acculturation process developed in traditional livelihood system of tribal community has practically endangered their age-old biocultural heritage and traditional skills, knowledge and technology in alarming proportion. The paper based on ethnobotanical field work discusses some vital aspects of plant based traditional skills and technology practiced by the rural *Adi* community of East Siang district of Arunachal Pradesh. A number of traditional plant based technologies such as handicrafts, fishing and hunting tools, storage items, utensils used in kitchen and foods system, etc. are available among the *Adis*. While crafting these valuable and low-cost traditional handicraft technologies, the local people are dependent on locally available plant biodiversity conserved in *jhum* land, kitchen gardens and community forest. Integrated and holistic approach can revive and sustain traditional plant technology through entrepreneurship development, coupled with ecotourism and economic empowerment to the concerned indigenous community.

Keywords: Traditional handicrafts, *Adi* tribes, Traditional utensils, Arunachal Pradesh
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In recent decades, the traditional communities worldwide are increasingly using their intimate knowledge of plants, soils, animals, climate, and seasons in sustainable and holistic approach without cause. This involves careful management, control of population, the use of small quantities but a wide diversity of plants and animals, small surpluses, and minimum wastage. Traditionally conserved plants provide food, medicines, pesticides, poisons, implements, building materials; animals provide meat, clothes, string, etc[1]. The importance of plant foods and medicines to the *Adi* people is well appreciated, however the plants used in traditional handicraft technology among the *Adi* were found to be overlooked[2-5]. The types of ecosystems, cultural diversity and skill competency are significant and determining factors among various sub-tribes of *Adi* community in Arunachal Pradesh, which affect the use of range of culturally important plant technology and conservation of related resources[4,6-7]. Room heating by burning of firewood at traditional fire heart, materials for shelter and transportation, clothing, implements, utensils, nets, and ropes necessities subsistence survival of various tribes in Arunachal Pradesh; all were provided by great abundance and variety of plants in the area[4].

Not only to a specific region like Arunachal Pradesh, even throughout the world, many indigenous and tribal communities are inclined to believe that centuries tested technological skills are integral part of their cultural heritage. But, the plant technologies of past and the number of items being made from plants have decreased considerably within last five decades and many of today's tribal craft people are of oldest generation[4,8]. Similarly, some skills, such as the age-old techniques of dying with plants and minerals and making some traditional tools and techniques have rapidly decreased in many tribal communities of Northeast India including in *Adi* tribes[4,9]. Nevertheless, the *Adi* people of remote socio-ecological systems are still attached with their rich cultural heritage of past generations. By initiating the works of their ancestors, modern artists, particularly carpenters and handicraftsmen have been able to

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recapture and even improve upon the skills and techniques of the past[2-4,6,7,10,11].

The culturally important plant technologies such as chair, table, kitchen utensils, fishing net and tools, dishes, tools for storage and preservation, etc made of wood, cane and bamboo are more popular and economically viable among *Adis*. The role of plant materials and technology in trade has also become increasingly clear in recent past in Arunachal Pradesh. Trading in carved goods and handicrafts were well established in the barter system of *Adi* community. The *Adi* people exchanged baskets, kitchen utensils and other agriculturally important tools and techniques under barter system. In the paper various aspects and importance of traditional plant technology and related biocultural knowledge of *Adi* community of East Siang district living in varying socio-ecological systems have been discussed. *Prabhu parvat* of the remote past, Arunachal Pradesh covers a geographical area of 83,743 sq km accounting for about 2.55 % of the total land area of the country. The entire state is a region of high mountains with great variations of altitude ranging from 200-7090 m. The state is rich in bioresources through diverse ecosystems with highly humid subtropical and tropical to temperate and alpine ecosystems[12-13]. The state has 28 major tribes and 110 tribes, which accounts for 64.20 % of the total population. The *Adi* is the largest tribe, which shares 14.39 % of the total population of Arunachal Pradesh. The state is unique in having traditional rights of various tribes over land, water and forests within their jurisdiction. Each tribe as a community exercises control over the natural resources within their surroundings

Methodology

Following the purposive sampling method, East Siang district of Arunachal Pradesh, India has been selected on account of forest cover, ethnicity and people's dependency on the forest resources and traditional plant technologies. From the selected district, three circles (administrative unit) were chosen purposively following the criteria adopted in district selection. In the third stage, based on the traditional plant technologies of *Adi* tribes, fourteen villages from three purposively selected circles were sampled using two criteria i.e. forest dependency and reliance on plant based traditional technology. While selecting the villages, traditional society (living in remote villages) and transitional society (living nearby the town) was adopted as socio-ecological criteria to see the variability in use pattern and conservation of traditional plant technologies. The villages, where indicators of modern development is negligible and communication is tedious and people mostly rely on their own institutions and biocultural resources was defined as remote socio-ecological systems, whereas *Adi* community living just opposite to it were considered the part of transitional socio-ecological system[14].

From the selected villages, the respondents of various age and resources were selected with the help of *Gaon Burha* (key communicator and headman of village) in equal proportion. The respondents (both men and women) from the respective villages *viz*. Koyu (10), Yagrung (10), Gune (10), Mebo (10), Napit (10), Balek (10), Kelek Mirmir (10), Sille (10), Mirsam (10), Yabgo (10), Kebang (10), Solle (10), Poglek (10) and Pangin (10) were selected randomly. The total sampled population, 70 men and 70 women, were chosen for the study. Field studies were conducted for 4 yrs (November 2003-February 2007) with the help of an assistant acquainted in local culture in East Siang district. During 2003-2004, direct observations and general survey from 30 women and 30 men of selected villages were made. More comprehensive interviews from another 40 women and 40 men were taken during 2005-2007 to provide the data on various plant technology used in food preparation, cooking, home made storage structures, fishing, hunting, storage, drying, etc. and conservation pattern of related biocultural resources. In addition, participant observations to assess the process of making and use of plant technologies were made. Participant observations and staying in *Adi* houses in forest areas were made to learn about cultural aspects of utensils, handicrafts and other technologies used in daily life systems. Subsequently, semi-structured interviews were used in order to gain more detailed information. The interviews were also conducted with the district handicrafts centre and cooperatives to understand the economics, various projects run by state and central government and network of handicrafts makers. To validate the information, fourteen chiefs *Gaon Burhas* (GB) of respective villages were interviewed to understand the history of the area and pattern of using plant technologies. The degree of high, medium and low for the use, culture and conservation variables were defined as the extent of adoption of plant resources as technology in life support system and livelihood, which make people self reliant in every aspect of day to day life for their subsistence survival. These

variables were measured with the score system of three point continuum as high, medium and low and 3, 2, and 1 score were assigned, respectively for the positive response, while reverse scoring was done for the negative response. The Prior Informed Consent (PIC) was taken from every knowledge holder to disclose his/her knowledge systems in public domain.

Results

Arunachal Pradesh is a land abounds with wisdom of beautiful handicrafts and traditional plant technology comprising wide range in variety[15-16]. The *Adi* people of East Siang since time immemorial have a tradition of artistic craftsmanship and a wide variety of handicrafts practices such as weaving, painting, pottery, metallic work, basketry, woodcarving, etc. The crafting of mats, wooden vessels and pottery speaks itself eloquently about their skill in handicrafts technology. Some of the major handicrafts and plant based technology are described in Table 1.

Plant based technology

Cane and bamboo based plant technology of the *Adi* tribes is of appreciable standard and most of the domestic requirements are made of biodiversity of these species. Hats of different sizes and shapes, various kinds of baskets, cane vessels, a wide variety of cane belts (woven and plain), elaborately woven brassier of cane and fiber, bamboo mugs with carvings, etc. deserve special mention. They have mastered the technique of basketry, and the designing of such items among the villagers has been found to be entirely need based, practical and are aptly suit to their socio-cultural and geo-geographical landscape. The two basic shapes observed are twill and hexagon, both open and closed. *Adi* basketry is beautiful not

Table 1 — Traditional utensils, tools and techniques made of plant biodiversity used by *Adi* tribes

Local name	Plant source	Uses
Dola	Bamboo or cane	Winnowing the rice grains
Dutup	Bamboo	Rice measuring
Dore	Bamboo	As dining table for keeping rice plate or any other eatables
Agin	Bamboo or cane	For carrying rice
Tali	cane or bamboo	Local *Adi* bag
Sobuk	Bamboo and wood or cane	Holder or cover of *Adi daw*
Keeper	Wood of *hollock, lali, hihong* are considered as best for making *keeper* for its hardness	Local grinder
Mene tekkeng	Wood of *hihong* tree having reddish colour inside is considered best one	For making meat pieces
Apo	Made of bamboo or cane	For winnowing rice grain
Bilen	Bamboo	For drying meats and fish
Geing	*Geing* (cane)	For scrubbing the ginger etc
Kurpyak	Bamboo or wild banana fibre or *toko* leaves	Mat
Hungem	Dibang bamboo	Local basket for keeping kitchen spoon and other utensils hanging on the *perap* above the fire place.
Megaap	Dibang bamboo	Used in fire place for holding firewood, coal and utensil.
Hupur	Dibang bamboo	Basket for storing maize
Porang	Dibang bamboo	Fishing trap, conical in shape
Pitak	Dibang bamboo	For chopping or making pieces of fishes
Pekak	Dibang bamboo	For keeping fishes during fishing
Kodong	Dibang bamboo	Fishing material
Ebar	Dibang bamboo	For collecting firewood from the forest
Gatbung	Dibang bamboo	Bamboo holder for keeping arrow
Epum	Wild bottle gourd shell	For filtering the *kala apong* (local beverage)
Geri	Wild bottle gourd shell	For carrying drinking water to agriculture field
Ejuk	Wild bottle gourd shell	For pouring drinking water
Lodung	Bamboo (*emu*, *ebing* bamboo)	For keeping salt
Tuli	Bamboo (*dibang*) bamboo	Basket made of bamboo for drting fresh fishes.
Tonsuk	Bamboo	For filtering *kala-apong* (local beverage)
Mobyang	Made of stone	Stone for grinding the *amo* (poison used for hunting)
eeye epuk	*Abung* and *dibang* bamboo	Arrow
Penyo	*Dibang* bamboo	Bamboo spoon for stirring rice
Ekku	*Dibang* bamboo	Rat trap (arrow shaped)
Oying ape	*Dibang* bamboo	Basket for keeping fresh vegetable
Madung	*Dibang* bamboo	Bamboo used for cooking rice and chicken

only because of the fine texture, but also because of the unusual and fascinating shapes they designed. There is definite correlation between the shape and the topography and climatic condition of the region. The angular and curling nature of some of the baskets has definite functional value.

Metallic work, carpentry, and pottery are other crafts practiced by the *Adi* people. Metallic work is not universal in Arunachal Pradesh and most of the requirement of tools and implements are made by the people themselves especially among the *Adis* and *Monpa*. The *Adis* were once expert in casting in brass. According to the history and mythology of *Adi* tribe, *Minor Bote* was the first ancestral God of metallic work and carpentry, respectively. The arts of crafting traditional utensils and handicraft items of immense utility from forest wood, clay and metal is thus inherited from ancient wisdom which is still practiced in *Adi's* locality.

Tools and traps used for hunting

The *Adi* resorts to hunting in their leisure time in order to supplement their food requirement. The weapons commonly used and made by them are spears, bows, arrows and *daw* (about 30-70 cm flat iron piece with sharp edge on one side crafted in the form of sword). Some of the arrows tips are fitted with sharp metallic head, which is caped with poisoned prepared from the roots of alpine herb, *Aconitum ferox* Wall. (*Omi*) and are carried in quivers of bamboo tubes. Such poison arrow is mostly used for killing large wild animals such as bear, wild boar and lion. The paste of *emo (omi)* poison used on arrow tip is prepared in special type of traditional utensil made of stone. The villagers have their own indigenous ways of trapping animals and birds using traditional plant based technologies. Like hunting, fishing also forms a subsidiary occupation. For fishing, they make various traps, big and small, with or without valves, made of bamboo & cane and such trapping items are popularly known as *porang* among the *Adis* (Fig. 1). Fishing nets of different types such as hand nets (Fig. 5), cast nets, etc. are also in use, which is made of locally available plant resources.

The art of trapping wild rats using bamboo made trap called, *ekku* (Fig. 2) is quite famous among *Adi* tribes. Such trapping technology has been found to be closely associated with their socio-religious ceremony such as marriage. Catching highest number of rats using *ekku* is recognized as positive attribute of male folk. The trapped rats are handed over by the groom to bride before marriage to signify his capacity and as an honour to bride. Later on, these rats after killing are smoked in *perap* (a traditional drier made of *dibang* bamboo) and preserved for eating. The trapping technique of rat using *ekku* is also found in the *Adi* art and culture. During interaction with hunters in the field, an intricate relationship of *Adi* skill, culture and plant biodiversity associated with their traditional life style and survival strategies has been closely observed (Fig. 7). Similarly, *yoksa* (*Adi* sword) made of iron and wood, long in shape, kept in the home is used in *ponung* dance. The handle of *yoksa* is preferably made of horn of *mithun* (*Bos fontailis*) and wood.

Wildlife, culture, plant biodiversity and skill

The integration of wildlife & plant biodiversity, which are life support systems for *Adi* tribes and ethnicity, depict the degree of skill and imagination power in making handicrafts. For example, *mithun* made of local cane species (Fig. 3)*;* monkey, Himalayan giant squirrel (Fig. 4); turtle (Fig. 6), hornbill (Fig. 7), mongoose; fish (Fig. 9) and various other mammals and birds made of *Terminalia myriocarpa (hillock)* and *Michelia champaca* (*teeta chap*) tree and bamboo species such as *Dendrocalamus hamiltonii, Dendrocalamus hookeri, Bambusa pallida* and *Bambusa tulda* are mostly employed in traditional house construction, as ritual and cultural gift items offered to benevolent almighty gods during local festival such as *arang* and *solung* apart from using them in crafting traditional handicraft items. Some of the indigenous species of perennial trees and palm species, like *toko-patta* (*Livistona jenkinsiana* Griff.) is considered multipurpose species and used in a number of aspects. For example, the leaves of *toko-patta* are used after proper drying as a roofing material for local houses. In thatched houses made of *toko* leaves, the longevity of leaves in kitchen room is about 10 yrs, while leaves of *Calamus erectus (rasen)* and *Musa balbisiana (Kullung)* used by the some villagers as thatching materials lasts for only 4-5 yrs. The new shoots of *toko* are used as vegetable, while unripe fruits are used as chutney. It is also used as covering tops of *doolies* (palanquins) and boats. Making hats is very common among the *Adi* villagers in order to protect themselves from torrential. Similarly, crafting of hand *bichoni* (fans) and coarse broom from the *toko* leaves is quite popular among the *Adi* tribes. The leaves are also used in nursery as overhead shade. The whole plant is used as an ornamental and avenue

plant, while fibrous sheaths are used in making ropes and water resistant shields for shoulder bags. The cut stem is used as temporary log bridge to cross over village streams and as posts for supporting temporary structures.

Traditional utensils and food habits

The dynamics of traditional utensils made of various locally available plant species and other ethnobiological resources used as traditional items were some of the significant observation made during field investigation. For example, *Du-bi* (bamboo cylinder) -used for cooking fish, rice etc.; *dengkam peking* [(earthen pots, made up of sticky clay) (Fig**.** 8)] - for cooking rice and meat; *e-kung edung* (bamboo cylinder) -for storing fermented bamboo shoot; *epo* [(made of bamboo) (Fig. 12)]- used for filtration of *apong*; *patek* (made of wood of jackfruit and *lirang* tree) - for chopping meat, fish, vegetables etc; *asi dupu* (bamboo cylinder) -for storing water (Fig. 11); *bu-yen* (made of bamboo strips) -for storing dry fish, meat, etc. (Fig. 10); *ekung* [(wooden plates) (Fig. 13)]; *eguk* (dried bottle gourd) -for serving *apong* (Fig. 14); *apong dubi* (bamboo cylinder) used for filtering *apong*, bamboo made sieve (Fig. 15)] used for filtering *apong*, *ambin pekak* (bamboo container) (Fig. 16)] used for measuring grains, *kepi* [(stem of a spiny palm species) used for rubbing rhizome and tubers, *Adi* cup and jug (made of bamboo) (Fig. 17) used for drinking *apong* and serving water, [(box for keeping betel-vine leaves) (made of cane) (Fig. 18)], *alo-adung* [(made of bamboo) (Fig. 19)] used for keeping salt, *giri* (Fig. 20) and *tonsuk* (Fig. 21) made of dried shell of wild bottle gourd covered with cane trip- used for carrying water and *apong* (beverage) in *jhum* field and storing *apong*, etc. are some of the examples of utilizing bioresources of their surrounding in traditional utensils, arts, crafts and food habits. The reason behind using range of traditional utensils made of plant resources are the intrinsic attachment with ecosystems and food habit. Special kind of flavour, keeping quality, and storage duration, for which traditional utensils are one of the sources, are major reasons quoted by experienced elders of community.

Traditional utensils are believed to be one of the main parts of a household property and are kept under the custodian of older generation of the family. They know the history of origin of traditional utility, mythology and folklore associated with utensils[17]. Having rice in *ekung* (rice plate made of brass) is considered tastier and good for digestion. In olden days, family elder were served foods in this plate to respect and honour, but now gradually this system is vanishing. With the availability of low-cost utensils, preservation of such traditional utensils are decreasing and thus loosing their prestige and value among younger generation. A traditional measurement of social status and wealth of *Adi* is measured with the number of brass and copper utensils he/she possess. Even in the verdict made by the customary tribal council on the any dispute arising on natural resources and social problems, the fine is charged by taking these utensils. The traditional utensils used in kitchen are made of copper, brass and other metals are considered as prestigious and precious. In interior and remote villages, the *Adi* villagers are still using the traditional utensil made of wood and bamboo. However, the bamboo utensils are still used by the *Adi* people living in even transitional socio-ecological systems because of low cost and easy availability. The dynamics of these factors is found more in remote villages. Various external factors such as influence of media, modernization, changing livelihood systems and various sociopolitical aspects, are weakening the traditional intrinsic value and skill of making plant technology.

Ethnicity, biodiversity and skill

Various God and Goddess are worshiped by *Adi* tribes with the belief that these spiritual powers are responsible for prosperity and livelihood. According to the age-old *Adi's* mythology, Goddess *Kini Nane* (Fig. 22) (responsible for agricultural propensity) has maintained the sustainability of paddy biodiversity. The idols of *Kini Nane* is also made of different tree species like *Terminalia myriocarpa*, and *Michelia champaca*, etc. and kept in holy places to signify the ethnicity. The interaction and cross cultural relations with non-tribal communities more particularly of Hindu theology were also observed in the art and handicraft plant technology of *Adi* tribes through some of the idols. *Adi* tribes also carve the idols of Lord Shiva and other deities from wood of *Terminalia myriocarpa* and *Michelia champaca*. Further, the depiction of tribal religion like of *Monpa* (followers of Buddhist religion) is also being observed in the handicraft technology of *Adi* tribes. The locally available biological resources such as cane, bamboo and trees have provided an ample opportunity for being selective apprehension and using them in various technologies. These bioresources are either used alone or in combination to make varieties of

daily usable domestic utensils, tools and technique for fishing, decorative items and ornaments.

Plant based technology and livelihood of *Adi*

The plant based crafts such as *agin* (bamboo or cane made basket for carrying rice, etc.), *eda* (for carrying firewood), *dore* (cane or bamboo made, used as table for dining), *muda* (bamboo or cane made, for sitting), *tali* (Fig. 24) (cane made, for carrying food items and beverages while going for work or to forest), *sobuk* (*daw* holder, made of cane), etc are mostly crafted by the male folk and form a source of income to *Adi*. In every household of remote socio-ecological systems, people possess skill to make these technologies and sell in nearby by town. Some of wooden, cane and bamboo made plant technology are sold through district handloom and handicrafts centre. These crafts are collected from the villages or built on the craft training centre. With the help of various central and state Government sponsored training and entrepreneurship development schemes, nowadays an emphasis is given on plant technologies for the capacity building and empowerment of *Adi* people. The gendered aspects of plant technology play a pivotal role in the variability for livelihood system. Thus, while preparing the training programme for entrepreneurships development such issues must be taken into account to make it more economically viable and successful.

Cultural knowledge in utilization and conservation of biocultural resources

The local biodiversity of canes, bamboos, palms and perennial tree species are invaluable in making various handicraft, utensils, tools and technique used for various purposes. The degree of use of such biocultural resources are determined by the factors such as ethnicity, economic status, ethical level, variability in ecological system and types of art and skill possessed by a particular community. The use of various traditional plant technology is higher [(use score value 200 out of 210 (Fig. 23)] in remote socio-ecological systems than the transitional system (use score value 40). This trend is proportionally comparable at medium and low degree of use also where the *Adi* people living in transitional socio-ecological systems are lower than the same community living in remote and far-flung areas. The cultural context and use of biocultural resources in plant technology are intermingled with each other. Higher cultural attachment towards a particular plant technology leads to the greater degree of use. Empirical observations indicate that in majority of the cases (73.25 %), *Adi* community living in remote socio-ecological system have higher degree of cultural attachment [(with the score value of 198 out of 210) (Fig. 25)] towards the plant technology in comparison to the same community living in transitional socio-ecological system who secured (79.85 %) cultural score only 68 out of 210. Majority (76.67 %) of *Adi* community of transitional socio-ecological systems have medium degree of cultural attachment with their traditional plant based technology (with score value 94 out of 140) whereas, the cultural attachment score value of same community of remote places was less (58 out of 140). Similar pattern was found for the degree of low level of cultural attachment.

The cumulative effect of cultural attachment and use level of biocultural related technology affect the conservation regime of biodiversity in any socio-ecological system. The effect of higher degree of cultural attachment and use level both are observed to be higher towards degree of conservation (score value 198 out of 210) of plant biodiversity used in making various technology in remote socio-ecological systems than the transitional community, whose degree of conservation is less [(score was 75 out of 210) (Fig. 26)]. Maximum polarization of conservation score value of *Adi* community living in transitional socio-ecological was observed at medium degree (110 out of 140) to low degree (45 out of 70) of conservation of biocultural resources used in making the traditional plant technology. This empirical observation revealed that the dynamics of culture and use value of any plant technology is affected by types of socio-ecological systems and the ethical level of people living in the respective system. The findings provide an insight that the cultural context and dependency on biocultural resources used in making plant technology by the *Adi* community living in remote locality is appreciable at present. But the cultural erosion and loss of nurturing institutions related to plant technology among younger generation-as is happening in transitional socio-ecological system, is being noticed. Erosion is accelerated due to the effect from acculturation process, Government policies of settled top-to-bottom approach of development and changing sociopolitical environment of community. Hence, this is the potential time to harness these culturally rich resources and conserve them with the bottom to-top approached planning geared by people provided they

Fig.1 *Porang* (fishing trap)

Fig.2 *Ekku* used for rat trapping

Fig.5 *Sabjung*, made of *ridung*

Fig.3 *Mithun* made of cane

Fig.4 Toys made of bamboo and *hollock* wood

Fig.6 Turtle made of wood

Fig.7 Hornbill made of wood

Fig.9 *Ngopi* fish

Fig. 8 *Dengkam peking*

Fig.10 *Bu yen* made of bamboo strip

Fig.11 *Asi* for storing water and *apong*

Fig.12 *Epo used for apong*

Fig. 13 *Ekung* (wooden plate)

Fig.14 *Eguk Bu yen*

Fig.15 Bamboo sieve

Fig.16 *Pekak*

Fig.17 *Adi* cups and jugs

Fig.18 Box made of cane

Fig.19 *Aalo edung*

Fig.20 *Giri*

Fig. 21 *Tonsuk*

Fig. 22 *Kine Nane* made of wood

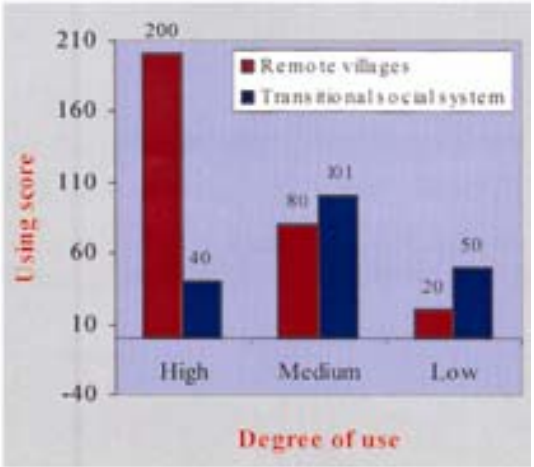

Fig. 23 Use level of traditional plant technology

Fig. 24 A cane made *Adi* bag, *tali*

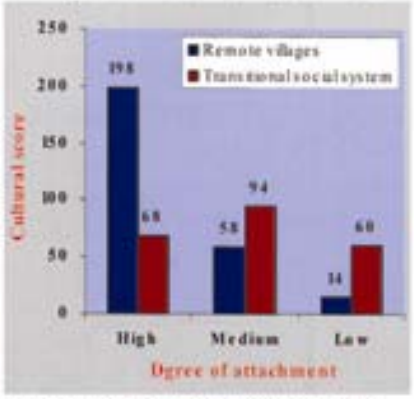

Fig. 25 Cultural attachment towards traditional plant technology

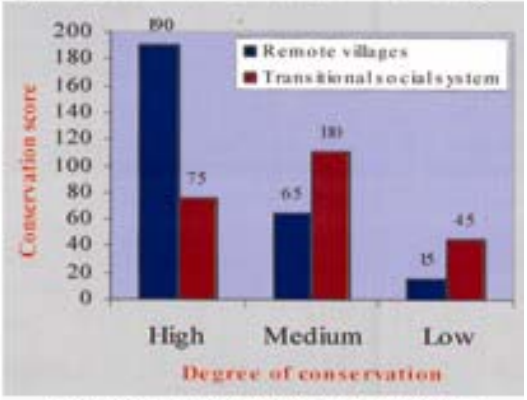

Fig. 26 Conservation of plant biodiversity

are economically and socio-politically empowered. This can be activated by taking the help of formal institutions, marketing and economic institutions, who add value, commercialize the products and secure the intellectual property of traditional communities. The entire approach- adopted in integrated manner, will help in conserving the biocultural resources used in traditional plant technology.

Discussion and conclusion

The *Adi* craftsmen of Arunachal Pradesh make various cane and bamboo crafts at the household level. Most of the domestic requirements are made of these materials. The *Adi* community depend on these materials almost exclusively for constructing their dwellings, utensils, furniture, and even weapons, such as bows and arrows, spears, armor, and implements like dibblers, hunting and fishing traps, etc. Apart from these traditional uses, bamboo and cane are crafted dexterously into colorful basket mats, belts, attractive smoking pipes, combs, and a variety of household tools and implements. The *Adi* tribes are considered good engineers and once built a 152.4 m long suspension bridge made of cane and bamboo over the Dibang River[14]. The traditional cane and bamboo made products are representing high premium on design, quality, local technology and focuses cultural identity. Modernization and cultural erosion among younger generation has affected the dynamics of traditional knowledge and use of plant technology in the life support system of *Adi* tribe[5].

The Government of India through Department of Science and Technology (DST) is trying to accelerate various aspects of biocultural knowledge and plant technology in Arunachal Pradesh; however such noble initiative would bear much fruits if private land owners and community are engaged in the management of wild species used in making traditional technology[18]. It is evident that, some of the traditionally managed sustainable system- like among *Apatani* tribe living in Arunachal Pradesh are empirically tested and observed to be sustainable, however, wild relatives of many plants are at risk and extinction in this state[19]. Human encroachment on land use pattern has created a threat to the valuable source of wild gene pool that is necessary to boost the ability of plant technology[20]. It is exceedingly important that wild plant diversity remains widely disbursed in both ownership and geographical region. There is an urgent need to value, restore, collect and utilize the native technology of north-east India. In order to successfully protect native plants, wild-lands and cultural landscape, multiple repositories with diverse ownerships interests is a necessity[21]. The plant technology of *Adi* people can be focused for its demonstration through significant value added components for profitability in marketing which will simultaneously help in conservation of biodiversity.

The traditional plant technologies discussed in foregoing sections have a bright future for economic empowerment of rural people of Arunachal Pradesh[22]. These technologies can be marketed with the help of information technology, NGOs, formal organizations like Northeast Council, Cane and Bamboo Technology Centre (CBTC) and Government initiatives like National Bamboo Mission, through a partnership programme. The objective and strategy of National Bamboo Mission are to promote, develop and disseminate technologies through a seamless blend of traditional wisdom and modern scientific knowledge and promote marketing of bamboo based handicrafts for generating employment opportunities for skilled and unskilled persons, especially unemployed youths. The North Eastern Council (NEC), in association with the National Vocational Training System are developing a network in the Northeast India for effective use of the bamboo and cane resources to improve livelihood options of the rural population. The entire effort can be linked-up and accelerated with the help of Cane and Bamboo Technology Centre (CBTC) Guwahati, which can take a lead role in this sector to impart skill and empowerment of people. Through the execution of such exercise, the information gaps can be filled and a viable and sustainable model on plant technologies marketing plan may be developed. This could be implemented in a participatory mode in phases as knowledge, experience, and production capabilities increase in the area of value addition to traditional plant technology and conservation of biocultural knowledge of not only *Adi* tribe but also other tribes of North-east India.

Expediting and opening more number of small-scale industries for promoting such knowledge and technology and sustaining the livelihood and conservation of biocultural resources is the need of the day. With a view to help developing arts and crafts and to substantiate the livelihood of the people, a number of craft centers have been set up and local people are imparted training in these centers. The rich heritage of arts, crafts and plant technological knowledge of Arunachal Pradesh is sure to add colour

to the cultural heritage of the country, however, mass production and infusion of new elements in this field have not added much for the cause of revival of these traditional crafts. The revival of traditional arts and crafts belongs to mostly people and survives on their patronage and good will.

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