Indigenous traditional knowledge in conservation and management of Bamboos of Barak valley, Assam

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Abstract

Bamboo forms an important component in the rural life of Barak Valley, Assam and therefore over the time period people have developed their own traditional management system. Of the 42 species of bamboos distributed in Assam, 20 species are distributed in Barak valley. The Barak Valley regions has an undulating topography characterized by hills (locally known as Tilla), wide plains and low logging waterlogged areas (locally called Beels) inhabited by socio-economically poor populace who are small land holders with paddy land as the major land use system and day labourer as the primary occupation. Present study reveals plantation development at the periphery of the holdings, propagation through rhizome, selective and clear-felling methods of culm/clump harvest are some of the indigenous traditional practices being practiced by the villagers. Present study also provides insight in to the few weaknesses of traditional system that can exacerbate ecosystem disservices resulting from clear-felling managerial system.

Keywords: *Indigenous, Traditional, Bamboo, Conservation, Management, Clump, Growth.*

Introduction

Bamboo is a member of grass family (Poaceae: Bambusoideae) with the characteristics of short rotation, marketability of culms every year and immediate returns (Nath *et al*. 2015). Bamboos are multipurpose plants of high economic and environmental value that converts solar radiation into useful goods and services better than most tree species (Franklin, 2008; Decipulo *et al.*, 2009). Bamboo forms the dominant component in the landscape of North East India (Nath and Das, 2008) and is probably the most extensively used plant resources and associated with all spheres of life (*e.g.*, food, medicines, crafts, agricultural implements, house building material, cordage, *etc.*). Moreover, bamboos offer a wide range of potential solutions to address the problems and hardships that may come with climate change (Zhou *et al.,* 2005, Nath *et al*., 2015).

Traditional knowledge can contribute to solving serious global problems through practices such as local conservation, sustainable use of plants and animals, and addressing issues such as climate change, desertification and water quality. Traditional knowledge is the knowledge, innovations and practices of indigenous and local communities practiced around the world. Developed from experience, gained over centuries and adapted to the local culture and environment, such knowledge is transmitted orally from generation to generation (Pushpangadan *et al.,* 2002). It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local language, and agricultural practices, including the development of plant species and animal breeds (Dene Cultural Institute, 1995). The value of indigenous traditional knowledge (ITK) is becoming recognized by scientists, managers, and policy-

makers, and is an evolving subject of national and international law (Anaya, 1996). However, the role of ITK in conservation and management of bamboo are being neglected (Krishnankutty, 1990). Traditional systems of resources use and management are often being recognized as sophisticated and appropriated as they are socially well based (Chandrashekhara *et al.,* 1997). Therefore, systematic collection and incorporation of farmer's knowledge should be given priority while developing any programme for the promotion of cultivation, use and sustainable management of the resources (Crene, 1991).

Few studies have been carried out from Barak valley exploring the traditional utilization and management of bamboos with its significance to rural life (Nath *et al.,* 2011), however, a detailed investigation is still lacking. Therefore, present article attempts to explore traditional conservation and management system involved in bamboo cultivation in rural landscape of Barak Valley, Assam.

Materials and Methods

Study Site

Study was conducted in the Irongmara (N24^{0}41. 828' E 92^{0}44. 575'), Rosekandy (N 24^{0}41. 764' E 92^{0}41. 279') and Loharband (N 24^{0}35. 081' E 92^{0}44. 585') Villages of Cachar district of Southern Assam. The climate of Cachar district is sub-tropical and humid, with a mean annual rainfall 2,550 mm, the annual average temperature varies from 11. 5 °C to 34 °C, mean annual relative humidity of this study site varies from 60% to 84% (Data Source Silcoorie Tea Research Centre, 2011-15).

Methods

For the study role of indigenous traditional knowledge in conservation and management of bamboos information's were gathered through field visits and interaction with bamboo growers through detailed and structured questionnaire. Productivity Index was calculated using the ratio between new shoot to the total numbers of culms per clump in each year. Culm growth parameters (culm CBH and height) and propagation through rhizomes under selected and clear-felling harvesting system were documented over the study period. For this purpose a total of 330 clumps from *Bambusa vulgaris*, *B. cacharensis*, *B. bamboos*, *B. polymorpha*, *B. nutans*, *B. tulda*, *B. jaintiana*, *Dendrocalamus hamiltonii*, *D. longispathus*, *Melocanna baccifera*, and *Schizostachyum dullooa* were selected from the selected three villages and marked them with aluminum foil for the consecutive observation over the study period.

Table 1: Bamboo species recorded in the Cachar District of Southern Assam during the study period

Sl. No	Local name	Botanical name	Habitat
1	Jai Baruah	*Bambusa vulgaris*	HG;P
2	Jai Baruah	*Bambusa vulgaris* var. *striata*	HG
3	Kata Baruah	*Bambusa bamboos*	HG;
4	Bethu	*Bambusa cacharensis*	HG;P
5	Barua	*Bambusa balcooa*	HG;P
6	Jama bethua	*Bambusa polymorpha*	HG;P
7	Makal Bans	*Bambusa nutans*	HG:P
8	Bakal Bans	*Bambusa tulda*	HG;P
9	Mritinga Bans	*Bambusa jaintiana*	HG;P
10	Bans	*Bambusa pallida*	HG;P
11	Pecha	*Dendrocalamus hamiltonii*	HG;F
12	Khang	*Dendrocalamus longispathus*	HG;P;F
13	Lathi bans	*Dendrocalamus strictus*	HG;P
14	Kalasundi	*Giganthocloa albociliata*	HG;F
15	Kali bans	*Gigantholoa nigrociliata*	HG;F
16	Muli	*Melocanna baccifera*	HG;F
17	Lota	*Melocalamus compactiflorus*	F
18	Lota	*Melocalamus indicus*	F
19	Dolu	*Schizostachyum dullooa*	HG;F
* HG= Home garden; P= Plantation; F= Forest			

Results

Bamboos of Cachar district

During the study period a field survey was conducted to document the species diversity of bamboo in Barak Valley. A total of 19 species of bamboos were recorded from Barak Valley part of Assam. It was observed that among 19 economically priority bamboo species identified in India (Rao *et al.,* 1998), 11 economically priority species grows in Barak Valley (Table 1) Distributional range of the species incorporates both cultivated lands (home garden) and natural forests. Among the cultivated species, "Bethu" (*Bambusa cacharensis*) was the most common species in term of its occurrence. *Bambusa cacharensis*, *B. vulgaris* and *B. balcooa* are the highest prioritized village grown bamboo species and widely used in traditional house-hold construction and other rural uses. Among the forest grown species, *Melocanna baccifera* and *Schizostachyum dullooa* are the most dominant and due to their thin walled nature are commonly used in craft preparation. Culm portion of *Schizostachyum dullooa* is also used for preparation of traditional diet that forms an important part of the culture of the people of the region.

Traditional bamboo foot bridge in the study area

Bamboo products used in fishing

Traditionally practiced propagation method

The villagers in the study area generally practice rhizome/offset cutting for bamboo propogation. For this purpose they select two to three years old disease free healthy culms (two year old culm is preferred by the villagers). Traditionally villagers cut the culms just after the second node from the ground and dig out the rhizome part with its roots and newly developed buds. Plantation is done in the previously selected places covering the cutting portion by jute/plastic bags containing humified cow dung.

Indigenous traditional knowledge in management and conservation of bamboos

The productivity of agro-ecosystem is limited mainly due to the soil based constraints such as undulating topography, shallow depth, poor fertility and limited water infiltration capacity, sparse vegetation cover during most part of the year and the animal population both wild and domesticated feeding on the limited forest, crop land (Virtucio, 2009). The cattle grazing further enhance soil degradation and also disturb the agro eco-system. These problems are safely tackled by establishing bio-fencing using bamboo species in the form of live fences on boundaries of cultivated fields by the traditional villagers. Moreover, to control the

erosion losses from the traditional holdings, villagers grow bamboos in the periphery of the holdings. Two types of felling strategies *viz.* selective and clear-felling are practiced by the villagers. In the selective one, mature culms are preferred to fell, whereas, in the latter almost all the culms in the clump are felled. Culm DBH (cm) and height (m) were studied under for both the harvest regimes and the data shows the degradative consequences of clear-felling system on bamboo productivity (Fig. 1 A, B and Fig. 2 A,B).

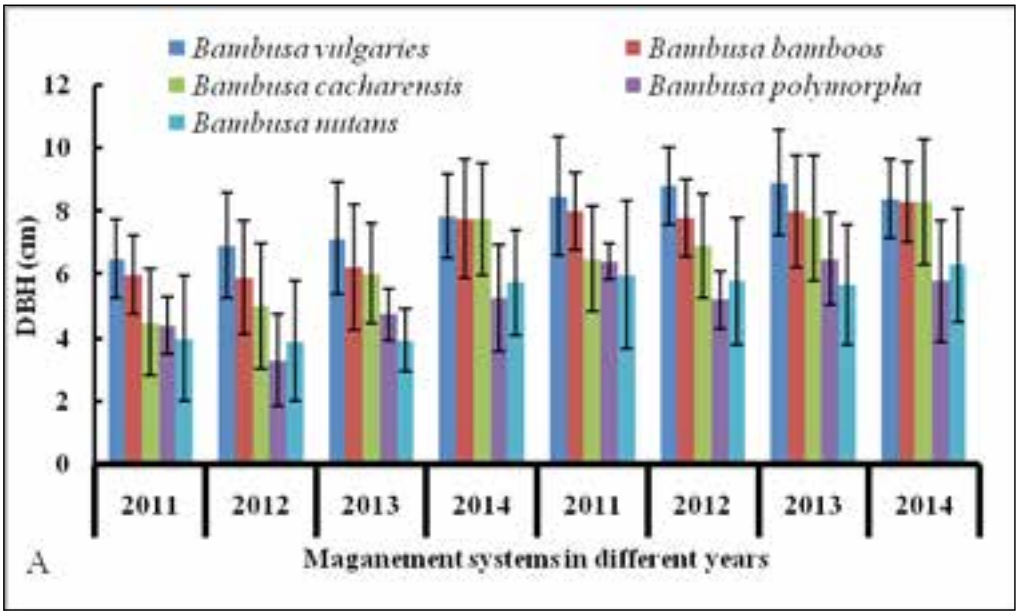
Photo Plate 3: Bamboo culms used for preparation of traditional food.

Discussions

Managing bamboos along the boundary of homegarden, fishery and other agricultural land fulfill diverse socio-economic needs of the villagers other than numerous environmental services. Besides household uses, woody bamboos *viz. B. cacharensis*, *B. balcooa* and *B. nutans* are also widely used in scaffolding sector and therefore develops another income stream for the bamboo farmers. Utilization of different bamboo species in different purpose supports the maintenance of bamboo diversity in the region (Nath *et al*. 2011). Bamboo shoot production mainly depends on the harvesting management (thinning of culms), as well as on water and nutrient supply (Franklin, 2008). Methodical clump management regimes are essential to prevent random harvesting, which results in a decline of clump productivity (Virtucio, 2009). In our study we found that the villagers restricted harvesting of young culms whose age less than two years. Harvesting of culms during the dry winter season prevented borer damage, as the starch content of culms at this time is very low, making them unattractive to insects. This finding corroborates to the findings of Dransfied and Widjaja, 1995. Our data suggested however, that selective cutting, defined by lower harvesting intensity of old culms, may result in weaker recruitment of new shoots, while treatments removing a larger proportion of old culms may increase shoot production. This trend can be explained by the fact that rhizome sections connected to younger culms are more likely to produce shoots (Malab *et al*. , 2009). Culm height and culm DBH of new culms in selective felling systems were found more than clear-felling systems. In clear-felling system, retention of less number of culms per clump cannot maintain the vigour of underground rhizome and yield of clump is reduced (Nath *et al*. ,

Plantation of *Bambusa vulgaris* in the boundary of pond

2009). However, clear-felling during rainy season as practiced by the villagers are partially compensated by new shoot production in the same year. This is because new shoot production in bamboos took place in rainy season. Data from our study shows although new shoot appears soon after the clear-felling of the clump but, are characterized with small size and height than that under selective felling. Therefore, along with traditional management systems scientific harvesting systems must be incorporated to maintain



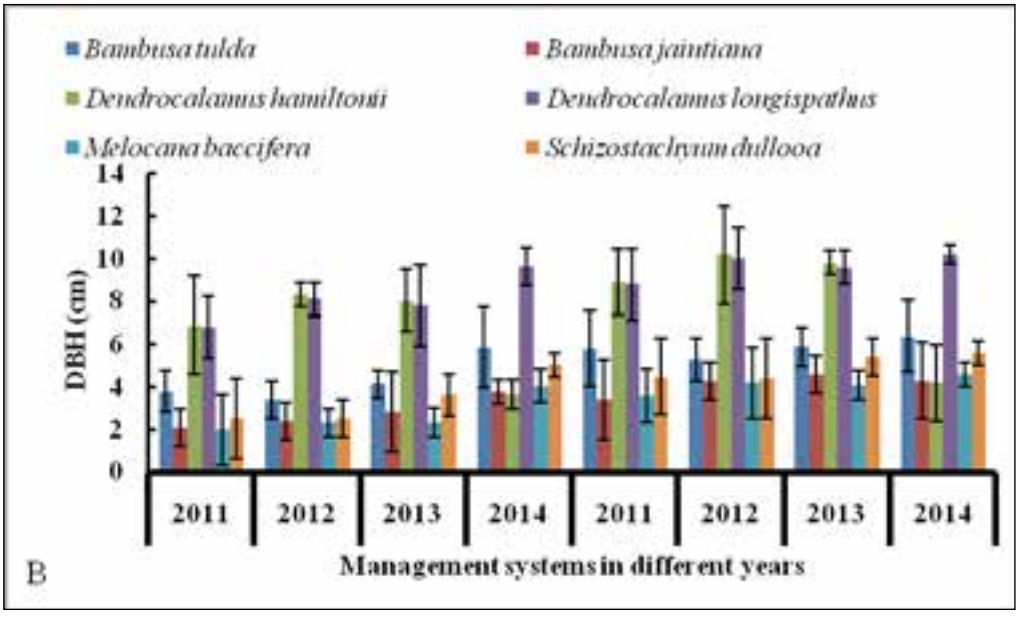


Fig. 1 A & B: Culm DBH (cm) of studied bamboo species in different traditional management systems during the study periods

the sustainability of the bamboo clumps.

Conclusions

The rural lives in Barak Valley are intricately related with bamboos. The villagers derive numerous direct and indirect benefits using this resource. The existing management and conservation system especially clear-felling system of clump management is unscientific. To increase the productivity along with traditional management and conservation knowledge some scientific management practices should be incorporated.

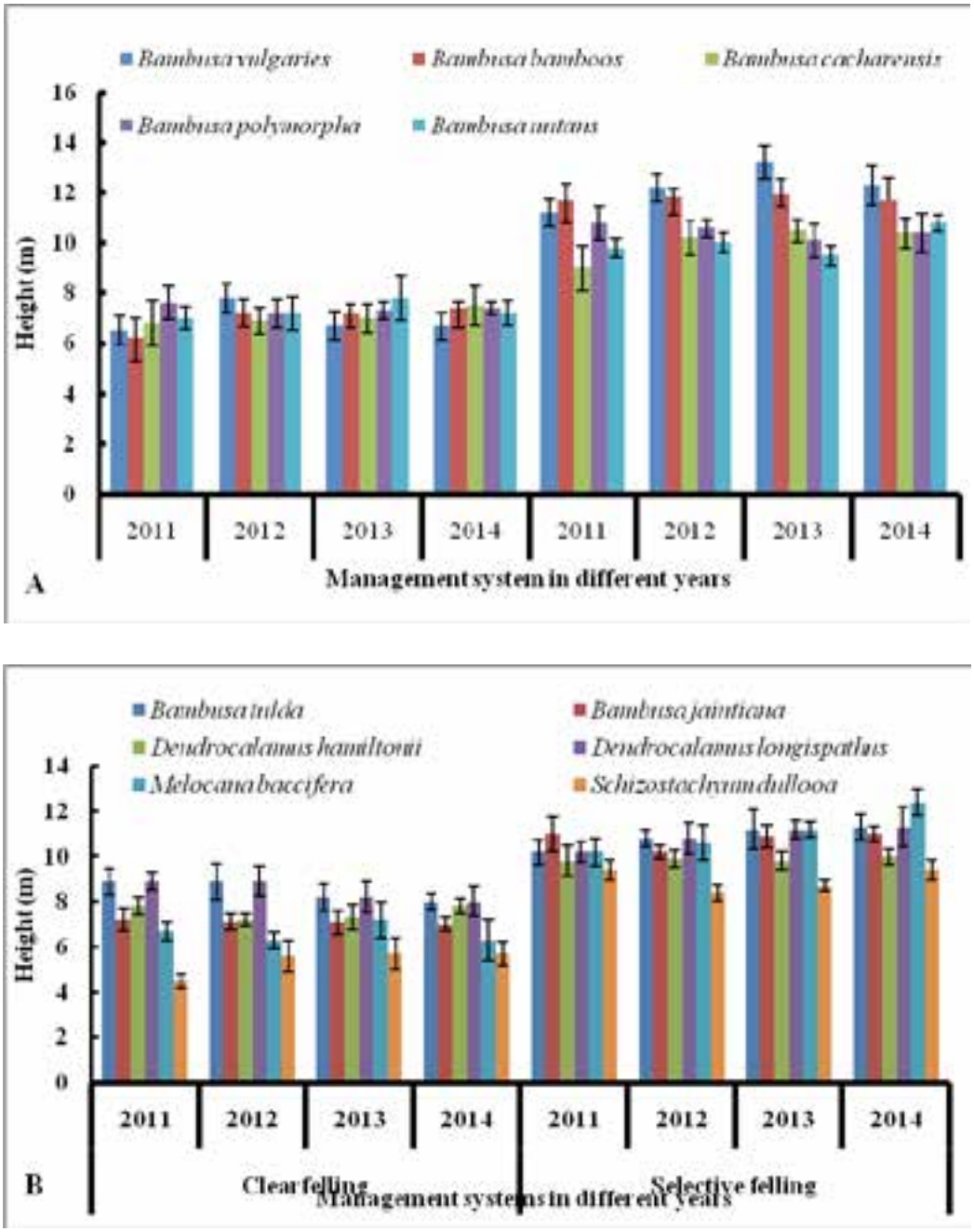


Fig. 2 A & B: Culm height (m) of a studied selected bamboo species during the study periods in different traditional management systems

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