Exploresearch ISSN:3048-815X(Online) Vol. 02, No. 03, July-September, 2025, 17-29

Original Article | **Peer Reviewed** | **Open Access**

Exploresearch

Impact Factor: 6.262

www.mgmpublications.com

Role and Functional Aspects of Bamboo Amongst the Ethnic Communities of Northeast India: A Case Study of the Karbi Tribe in the District of Karbi-Anglong, Assam

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Citation*: Borah, S. N., Sarma, K., & sarma, A. K. (2025). ROLE AND FUNCTIONAL ASPECTS OF BAMBOO AMONGST THE ETHNIC COMMUNITIES OF NORTHEAST INDIA: A CASE STUDY OF THE KARBI TRIBE IN THE DISTRICT OF KARBI-ANGLONG, ASSAM. Exploresearch, 02(03), 17–29. https://doi.org/10.62823/exre/2025/02/03.80*

Article History:

Received: 25 June 2025
Accepted: 25 July 2025
Published: 02 August 2025

Keywords:

Chujoon, Rongker, Livelihood, Questionnaire, Diversity.

Abstract: *Bamboo is regarded as the 'green gold' or 'poor man's timber' and is one of the highest producing global renewable natural resources. It is a versatile plant possessing more than 1500 uses and forms an indispensable component in the socio-economy of the rural ecosystem in Northeast India. Bamboo groves or patches are observed to be situated in the two hill districts of Assam, namely Dima Hasao and Karbi Anglong. The present study aimed at understanding the socio-economic dependency of the Karbi tribe on bamboo resources as well as to document the utilization of bamboo in the cultural festivals of the Karbi community for sustenance of their culture & ethnic heritage. Participatory Rural Appraisal (PRA), focus-group discussions, key-informant interviews and semi-structured household surveys were deployed for the purpose of primary data collection. Results revealed that Bambusa tulda, locally referred to as Jati bamboo is predominantly available and observed in the homestead gardens. However, in the natural forested regions, both Bambusa tulda & Dendrocalamus hamiltonii, locally referred to as Kako/Kaipho had a major occupancy. Bamboo is intimately utilized by the locals for the purpose of construction and artwork, handicrafts and agricultural as well as fishing implements. In addition, Bamboo plays an indispensable role in various ethnic rituals and cultural festivals of the Karbi tribe namely Chujoon, Rongker, Karbi Youth Festival, etc. However, bamboo sale and marketability has reduced over the years. Shutting down of paper mills is one of the major reasons towards less involvement in Bamboo farming and management. Illegal trading and third-party exploitation were also reported in the bamboo supply-chain.*

Introduction

Bamboo is one of the most essential renewable non-timber forests produces (NTFPs) belonging to the Poaceae family. They are tall and woody stemmed grass which can adapt to various climatic and edaphic environments (Yuen et al., 2017). The occurrence of bamboos in India is observed to be in a

plethora of forest types, extending from tropical to sub-alpine regions, preferring high precipitation ranging from 1200 to 6350 mm (Tewari et.al., 2019). India is ranked third after China and Japan in terms of bamboo species diversity (Sarma et al., 2010). Tamang et al. (2022) reported that a total of 148 bamboo species pertaining to 33 genera are reported from India, out of which the North-Eastern Region (NER) comprises of 63 different species belonging to 15 genera. *Bambusa* and *Dendrocalamus* are widely prevalent bamboo genera in the Indian context (Nirala et al., 2017*).* Bamboo is regarded as the 'green gold' or 'poor man's timber' and is one of the highest producing global renewable natural resources (Singh et al., 2015).

Table 1: Availability of Bamboo in North-Eastern Region (Source – ISFR, 2023)

North-Eastern States	Bamboo bearing area (in million hectares)
Assam	1.8424
Arunachal Pradesh	1.573
Manipur	0.751
Meghalaya	0.534
Mizoram	0.477
Nagaland	0.398
Sikkim	0.101
Tripura	0.45
Total	**6.13**

Bamboo is a versatile plant possessing more than 1500 uses (Tripathi and Hazarika, 2003). The estimated global market of bamboo products is approximately around US $7 billion (Yuen et al*.,* 2017). Some of the common uses include wall paneling, briquettes for fuel, housing construction, floor tiles, paper and pulp, furniture, food, medicine, handicrafts, agriculture, etc. In addition, based on their physiology and growth characteristics, bamboos are ecologically important species for their contribution towards carbon sequestration, erosion management, land rehabilitation and water conservation (Nandy et.al., 2004). Seeds of bamboo are extensively utilized for the purpose of consumption to enhance fertility by the indigenous Kani tribe community of Kanyakumari district of Tamil Nadu, India (Kiruba et.al*.,* 2006). Rich in diverse nutrients and minerals, bamboo offers potent antioxidant, anti-aging, anti-bacterial and anti-viral properties (Baishya & Baishya, 2022). Tea tribe community of Assam were reported to be considerably dependent on bamboo resources for a wide variety of utilities like house construction technology, farming/fishing products and other miscellaneous products such as hen cop, flower pots, hat, carrying basket, hand fan, stool, etc. (Nath et.al*.,* 2011). Bamboos also provide crucial habitats for abundant wildlife, supplying them with food source and shelter (Linderman et al., 2005). Bamboos form an indispensable component in the socio-economy of the rural ecosystem in Northeast India. Bamboo grows naturally in the forests as well as being cultivated in the private homegardens of the region. It serves as an integral component in the socio-economic lives of the communities and is widely being utilized in social, cultural as well as religious festivities (INBAR, 2016).

Table 2: Uses of Bamboo (Source – Das et.al., 2015)

Ecological Benefits	Social benefits	Economic benefits
Erosion management	Landscape aesthetics	Food
Carbon sequestration	Education	Medicines
Soil and water conservation	Bamboo culture	Paper and Pulp
Wind breaks		Furniture and handicrafts
Degraded land restoration		Incense stick industry
Shelterbelts		Bamboo charcoal
Biomass production		Bamboo fiber-clothes

Some of the remarkable and significant cases of bamboo use and entrepreneurship has been observed from Northeast India, such as use of bamboo for drip irrigation in Meghalaya, production of bamboo charcoal and briquettes in Nagaland, trading and manufacturing of Agarbatti sticks in Tripura (INBAR, 2016). In addition, a few of the successful cases of bamboo entrepreneurship have also been reported from Gujarat and Rajasthan such as production of bamboo-based school furniture and household-based charcoal production (INBAR, 2016). However, there is an urgent need for proper institutional models, financial incentives, training, guidance and support, ease of technology, stakeholder collaboration and access to up-to-date information for the initiatives to prosper and flourish. The government, in consultation

with the relevant stakeholders can play an instrumental role towards eradicating the sectorial issues plaquing the growth and development of bamboo sector in the NER by bridging the infrastructure and research-related gaps, supporting technical extension, generation of information, databases and trading centers and incentivization of promising ideas and initiatives for inclusive and sustainable economic development (INBAR, 2016). The objectives of the study were to understand and highlight the socio-economic dependency of the Karbi tribe on bamboo resources and to observe as well as document the utilization of bamboo in the traditional festivals of the Karbi community for preservation of their culture and sustenance of their rich ethnic heritage.

Materials & Methods

Study Area

Karbi-Anglong, located in the administrative division of Central Assam is considered the largest district of the state. Enriched with lush green forested hills and flat plains, it is geographically bounded by Golaghat and Nagaon districts in the North, Dima Hasao in the South, Hojai in the West and Nagaland in the East. Mosaic of different forest types and vegetative cover are prevalent in the district, namely Moist Semi-Evergreen Forests, Moist Mixed Deciduous Forests, Riverain Forests & Miscellaneous type with scattered pure or mixed patches of Bamboo (Champions & Seth, 1968). The population of the entire district is predominated by the Karbi tribe. The Karbi community racially belongs to the Mongoloid group and linguistically to the Tibeto-Burman group (Teronpi & Das, 2016). Apart from the Karbi community, the other inhabiting ethnic communities are Bodos, Kukis, Dimasas, Hmars, Garos, Rengma Nagas, Chakmas, Tiwas and Tai-speaking groups (Teronpi & Das, 2016). Bamboo forests are not found to be exclusively available in the plains of Assam. However, a few pure bamboo groves or patches are observed to be situated in the two hill districts of Assam, namely Dima Hasao and Karbi Anglong. Around 40 different species falling under 10 genera are have been reported from Assam (Borua & Borthakur, 2023). The hilly areas of Karbi-Anglong are occupied with Bamboo species such as *Melocanna Baccifera, Schizostachyum dullooa, Dendrocalamus hamiltonii*, whereas the plains are dominated with *Bambusa tulda* & *Bambusa balcooa* species (Borthakur *et.al.*, 2021).

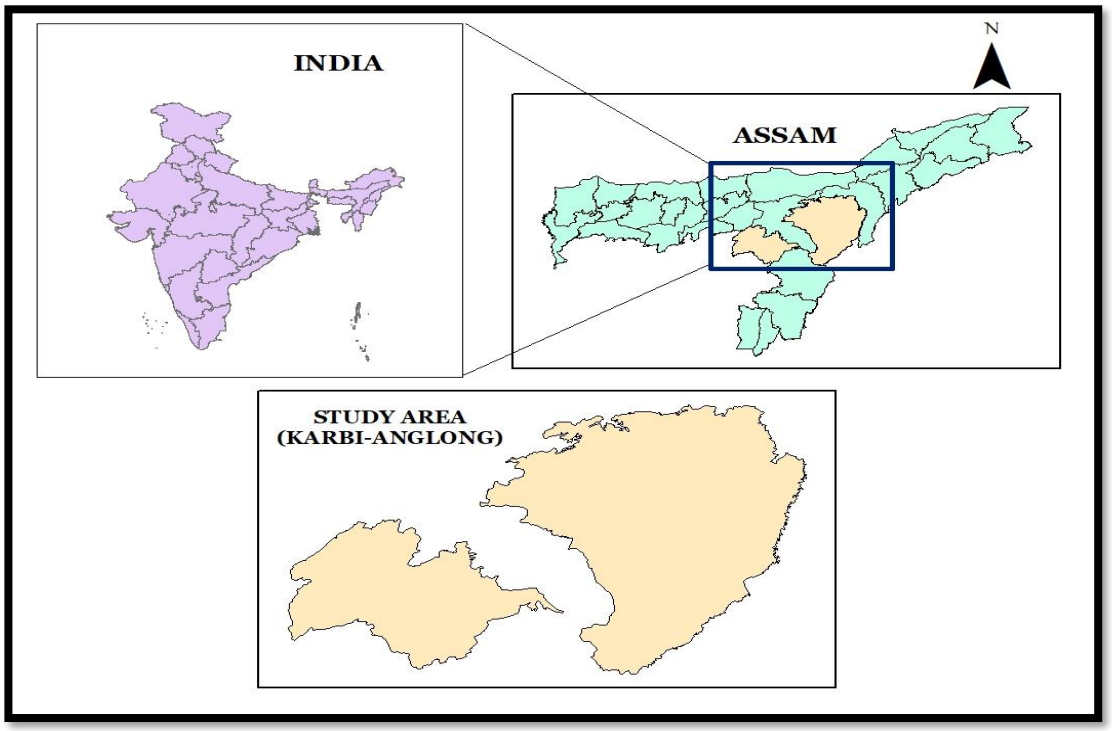

Figure 1: Study Area

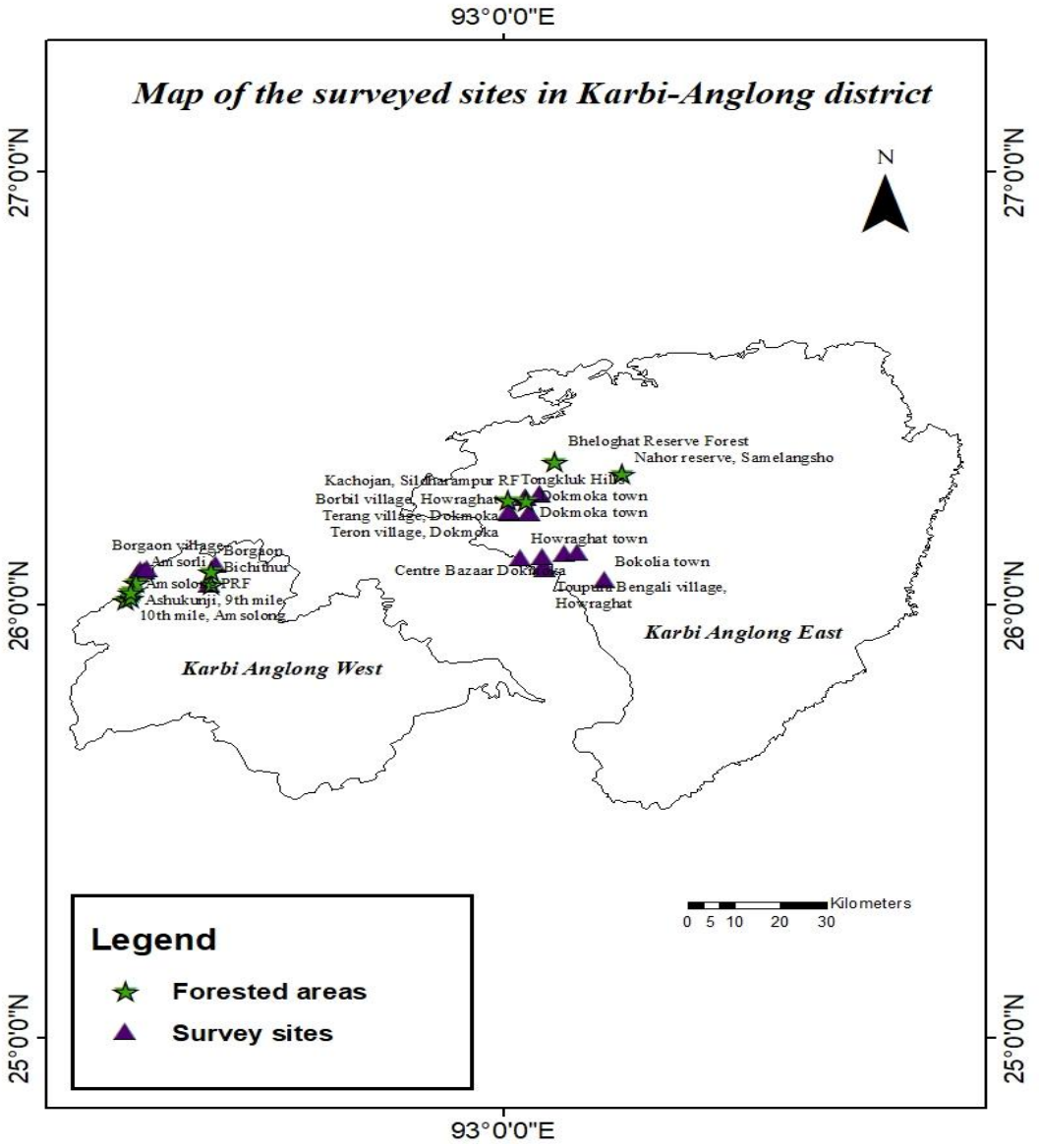

Figure 2: Map of Surveyed sites in study area

Methodology

The study was conducted for a period of 7 months between August, 2023 and February, 2024 in the areas falling under the jurisdiction of Dokmoka as well as Ouguri forest ranges of East and West Karbi Anglong, Assam. Systematic review of the prevalent literature from an array of sources was undertaken to briefly discuss about Karbi-Anglong and the Karbi community. Participation-based models such as Participatory Rural Appraisal (PRA) or participatory learning & action (PLA) was adopted for critically analyzing the challenges faced by the rural populace, integrating their opinions & active involvement towards planning and contribution for growth and development of their respective communities. Random stratified sampling was executed for shortlisting of villages and the households. A total of 11 forested regions and 16 villages were sampled for the study comprising of 450 respondents which included the households, key-informants, local stakeholders, forest officials, bamboo traders and growers. The respondents belonged to an age ranging from 25 to 58 years. Fig. 4 depicts the village-wise distribution of

various local dwelling communities. respective communities. A semi-structured questionnaire was prepared, pilot-tested through a reconnaissance survey and finalized before operationalization of field research. A multitude of PRA tools like key-informant interviews, field-based observations, focus-group discussions, community interactions and semi-structured questionnaire surveys were deployed for the purpose of collecting data regarding the significance and role of bamboo amongst the Karbi community residing in the study area. The questions asked during field survey included a) Distribution and availability of bamboo b) Traditional significance and use of bamboo in various rituals and ethnic culture c) Bamboo-based livelihood, market & its associated challenges. The study area and survey location maps were generated using ArcMap version 10.8.1.

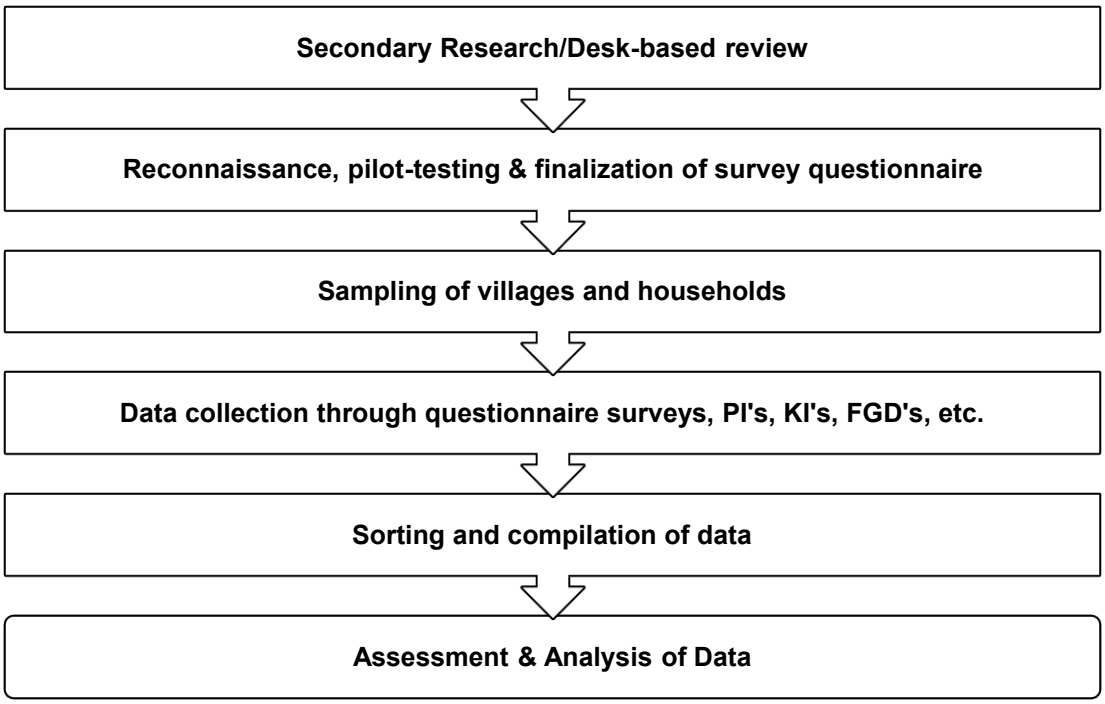

Figure 3: Flowchart of Research Methodology

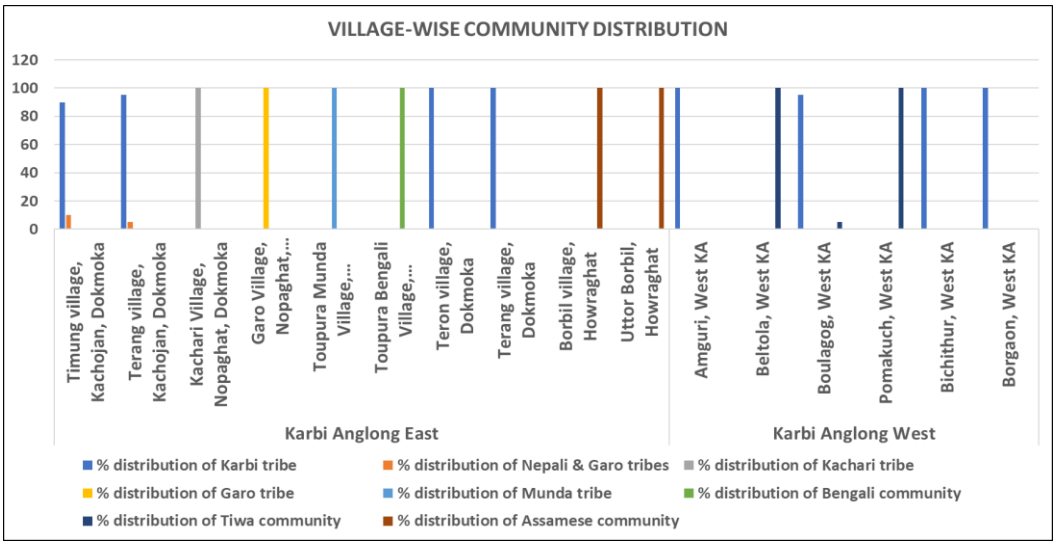

Figure 4: Village-wise Community Distribution

Figure 5: Field Pictures from Study Area

Results

- **Diversity of Bamboo Species:** Bamboo groves, mixed with other forest types such as Tropical Moist Deciduous and Tropical Semi-Evergreen forests, covers an area of approximately 2 lakhs and 40 thousand hectares contributing to 23% of the total geographical boundary (Borah *et.al.*, 2025). *Bambusa tulda*, locally referred to as Jati bamboo is predominantly available in the homestead gardens (refer fig. 6). However, in the natural forested regions, highly dense distribution of both *Bambusa tulda* & *Dendrocalamus hamiltonii,* locally referred to as Kako/Kaipho were observed (refer fig. 7). Kaipho is exclusively not cultivated in the homestead gardens by the Karbi community owing to some cultural & religious taboos. As reported by the respondents, Jati is widely cultivated for the purposes of construction and preparing agricultural as well as fishing implements and is one of the most preferred species for farming as well as business, attributed to its durability, strength and robustness. Apart from Jati, other species like *Bambusa balcooa* (locally known as Bhaluka), *Bambusa vulgaris* (locally known as Bijuli), *Dendrocalamus giganteus* (locally known as Mokal), *Malocanna bacciferra* (locally known as Muli) *and Bambusa vulgaris* (locally known as Jai) were also cultivated and raised in the rural homestead gardens. *Bambusa vulgaris*, commonly referred to as Bijuli bamboo is essentially employed for creation of bamboo sticks, flute and other traditional musical instruments. Kako/Kaipho bamboo, which is procured from the forested regions is significantly used for preparing various local handicrafts. It is also popularly deployed for generation of paper. Jai bamboo, as seen in one of the villages of Karbi Anglong East, adjacent to the border with Nagaon district of Assam is not prioritized by households, as reported by the key informants for growing, owing to its higher susceptibility and greater risk towards pest infestation.

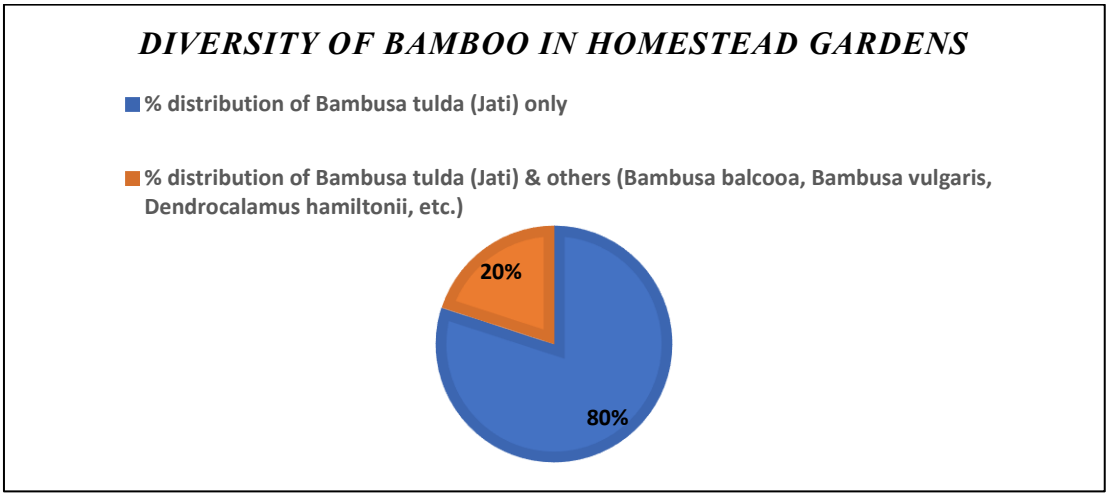

Figure 6: Diversity of Bamboo in Homestead Gardens

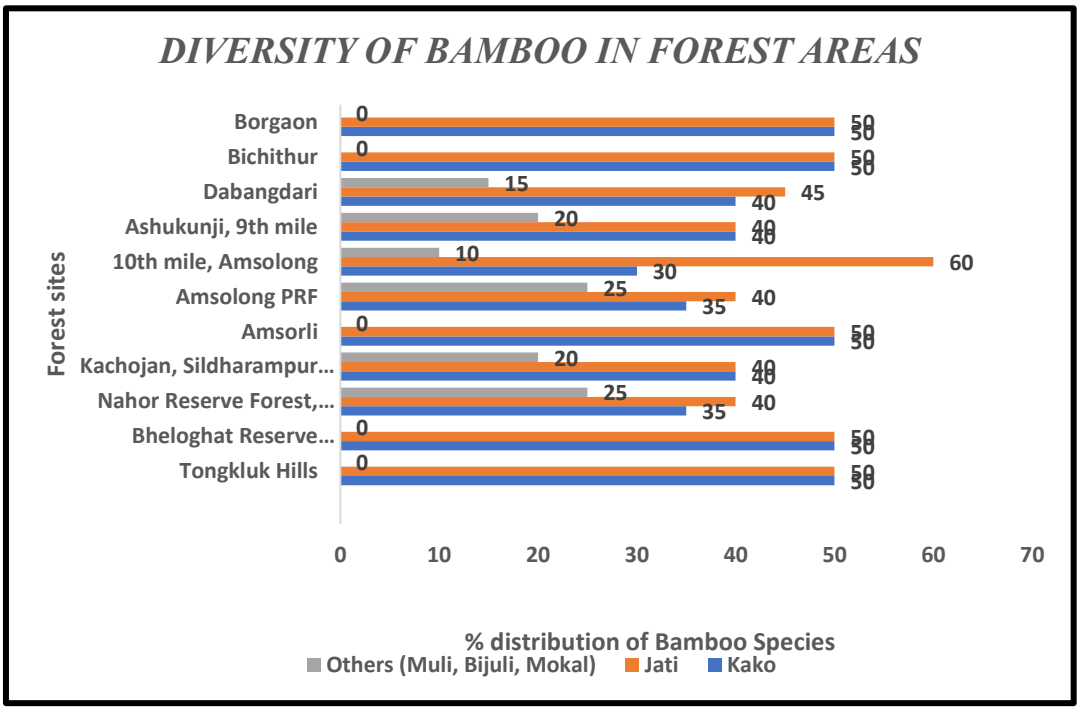

Figure 7: Diversity of Bamboo in Forest Areas

Through on-site observations and based on insights from a couple of key stakeholders from the Northern Afforestation Forest division of Karbi-Anglong Autonomous Council, human encroachment has been a prevailing issue in East Karbi-Anglong as vast stretches of natural forest plots are transformed into private plantations comprising of arecanut, tea, Sal, Teak, rubber plant, broom-grass and Jati bamboos.

- **Significance of Bamboo in Rituals and Culture**: Life begins and terminates with Bamboo for the Karbi community (Teron and Borthakur, 2012). It plays an indispensable role in various ethnic rituals and cultural festivals of the Karbi tribe namely *Chujoon, Rongker*, *Chomangkan*, *Banjar-Kekan*, Karbi Youth Festival, etc. *Chujoon* and *Rongker* (also known as *Than Puja*) are traditional Karbi festivals celebrated during the winter season to offer homage and tribute to the ancestral

deities for well-being, success and prosperity of the households. *Rongker* is organized by the entire village or hamlet at the village headman's property for the welfare of all the residing households whereas *Chujoon* is conducted by the individual households for self-prosperity. Various livestock such as pigs, birds and goats are sacrificed and consumed in both the rituals. *Langthei* (Bamboo-based hollow tubes for drinking water), *Meicham* (A type of bamboo-based utensil used for storage of pork meat, rice, etc.), *Chuhu* (Bamboo handicraft used to keep the hot utensils to prevent its contact with floor), *Vo-um* (A bird cage for keeping the chicken meant for sacrifice), *Thap* (A platform to hoard the raw material for preparation of local alcoholic beverage), *Hoton* (Bamboo handicraft used to stock cooked rice, vegetables and other culinary delicacies), *Beleng* (Used for sun-drying of vegetables and fruits), *Langpong* (Bamboo tumblers used for the purpose of drinking local alcohol), *Xakk, Khangra, Ington, Fakum* (Different types of storage apparatus), etc. are prepared out of bamboo for the purpose of usage in the respective festivals. *Melur* (Bamboo stem), *Bongkrok* (Gourd) and *Vophong* (Bamboo leaf) are profoundly utilized during the conduct of the rituals and ceremonial rites.

Table 3: Significance of Bamboo in Karbi Festivals

Karbi Festivals	Significance of Bamboo	Local/Common names
Chujoon & Rongker	**Storage-based handicrafts**	***Hoton, Meicham, Xakk, Khangra, Ington, Fakum***
	Drinking	***Langthei, Langpong***
	Bird-cage	***Vo-um***
	Platforms	***Chuhu, Thap***
	Religious offerings	***Mehur, Vophong***

Figure 8: Bamboo-based handicrafts in traditional Karbi festivals

Bamboo is also intricately associated with the traditional diet of the Karbi households. Bamboo shoots are majorly utilized in preparation of different ethnic cuisines and are also considered to cure Measles (Singh, 2015). Primarily, the shoots of Kaipho/Kako bamboo are leveraged by the Karbis in their local delicacies. An alkali prepared from young stems of Bamboo, locally called as 'Arjang Aphelo' finds its implications in management of vomiting, headache & stomach-related ailments. Karbi Youth Festival (KYF), a major and significant festival celebrating the rich Karbi customs and heritage is celebrated every year where bamboo is extensively used for construction of temporary stalls, exhibition huts and showcasing the Karbi culture through folk music & dance. *Lingpum Sokchon, Banjar Kekan, Hacha Kekan*, etc. are traditional dance forms of the Karbi community where bamboo finds its utility as props (Teronpi & Das, 2015).

- **Bamboo and Livelihood**: Bamboo plays a highly crucial role in the socio-economy of the Karbi community. It is intimately utilized by the locals for the purpose of construction and artwork, handicrafts, agricultural as well as fishing implements. Jati and Kako bamboo are the most preferred species for cultivation, as interpreted during the field survey. The villagers are highly to moderately dependent on the forests for procurement of Kaipho. In terms of the forest land under PRF (Proposed Reserve Forest), the locals must obtain special permit from the forest department and additionally pay a royalty fee of Rs. 2/culm for obtaining Kaipho bamboo. Kako/Kaipho is utilized for creation of handicrafts, whereas Jati is cultivated with an intent towards construction of houses, fences and agricultural implements like *Jintaak* (Rope prepared out of bamboo for wrapping up of the harvested crops) and *Phanki* (A bamboo-based shoulder pole for transporting crops). The Karbi homes are typically made of bamboo, wood & thatch on a raised bamboo platform, commonly called as *Klong* (Bhattacharjee 2015). Bhaluka bamboo is not chosen and prioritized by the residents for farming, on account of its low durability. Most of the rural households possess the adequate skills, knowledge and expertise as well as engage household labor for generation of the bamboo-based items for day-to-day requirements. They are not dependent on the market for procurement. During the initial stages, the bamboo saplings are protected from the cattle by a bamboo-based/wooden fence. Thereby and as per the responses received from a few Bamboo traders, sale of bamboo products is significantly higher towards the National Highway as compared to the shops present towards the interior regions indicating a negative correlation between Bamboo sale and connectivity towards the National Highways (*refer table 5*). Furthermore, the sale has been reported to be higher during the monsoons, especially for fishing-based equipments like *Soklet* (Handicraft prepared out of bamboo to catch fishes) and agricultural implements. Additionally, tourist influx plays a pivotal role in bamboo sales. More is the tourist influx, higher is the sale & vice-versa. The number of years in bamboo business, as disclosed by the traders, has been observed to be ranging from 1 to 25 with an average of 11 years (refer table 6). The bamboo market was observed to be segregated into two different categories, bamboo handicraft stores which would sell a plethora of agro-based, household and fishing implements and raw bamboo stores which dealt with the sale of mature bamboo culms (refer fig. 10).

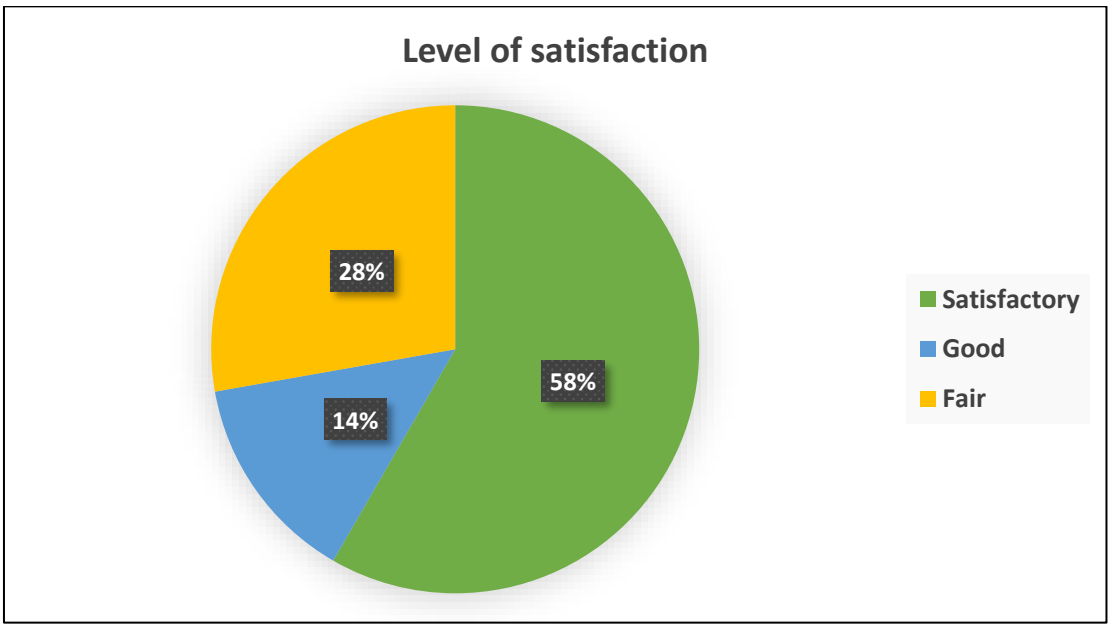

Figure 9: Business Satisfaction Levels

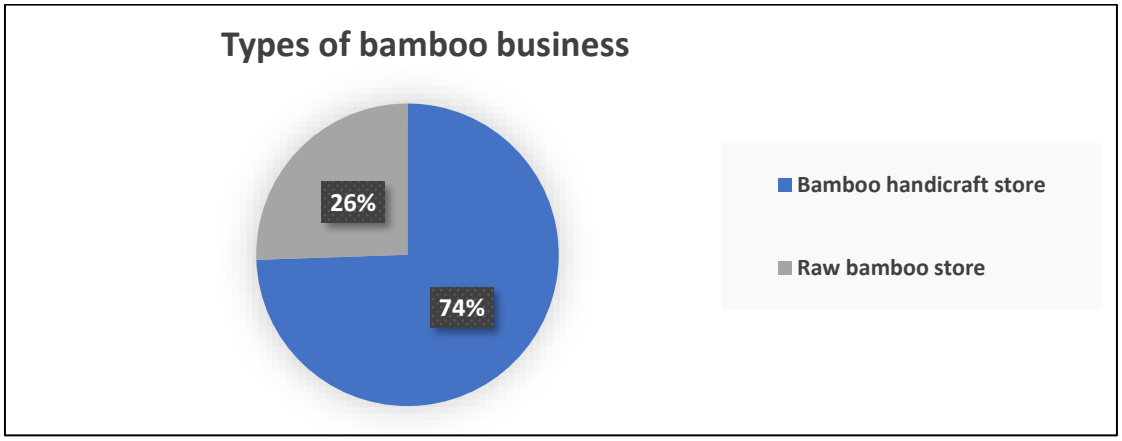

Figure 10: Types of Bamboo Business

Business has been majorly observed to be satisfactory, meeting the daily and bare minimum requirements of the traders (refer fig. 9). The area under bamboo plantations in the homegardens ranges from 0.02 to 0.53 hectares with a mean of 0.23 hectares (refer table 4). Despite of tremendous availability of bamboo resources in the homestead gardens, the sale is not regular and profitable. As expressed by the shopkeepers, with the advent of cutting-edge state-of-the-art technologies and modern machinery, the dependency on traditional tools and equipments have reduced significantly.

Table 4: Area under Bamboo Plantations in Homestead Gardens

Area under bamboo plantations (hectares)	
Maximum	0.53
Minimum	0.02
Mean	0.23

Table 5: Relation between Distance from the Highway and sale of Bamboos

Distance from the National Highway (meters)	Sale of Bamboo
0-200	**High**
200-1000	**Moderate**
>1000	**Low**

Table 6: Number of years in bamboo business.

Number of years in bamboo business	
Maximum	25
Minimum	1
Mean	11

Moreover, the respondents reported dissatisfaction as they were deprived of the actual profit rates due to involvement of various middlemen or third-party agencies in the bamboo supply chain indicating non-transparency in the supply-chain. The residents of Timung village, East Karbi Anglong cited the involvement of a company in sourcing of smaller-sized bamboo culms from the villagers since a couple of years. The farmers expressed disgruntlement as they would derive a very nominal price of Rs. 10/15 per bamboo culm highlighting the exploitation by intermediary agents. Trading and business are confined and limited to multiple sites within East Karbi Anglong. Borgaon is considered as the commercial hub for bamboo trading and business in West Karbi-Anglong. Bamboo is exported to companies across several states such as Maharashtra, West Bengal, Uttar Pradesh, etc. as well as for the Karbi Youth Festival (KYF) in massive quantities from Borgaon, West Karbi Anglong. Households with private plantations must pay a royalty fee to the Bamboo committees for the purpose of involvement in the bamboo supply chain. In case of possession of patta land, NOC (No Objection Certificate) is required supply chain. Sometimes, there are

chances of bulk rejection from the company's end due to which tremendous losses are incurred by the bamboo cultivators. On interviewed, the rural inhabitants expressed displeasure and low interest towards involvement in bamboo farming and business attributed to the reasons mentioned above. Furthermore, lack of awareness (refer fig. 11*)* has been observed regarding the various government schemes and policies pertaining to bamboo, especially amongst the rural population. Households are thereby, transitioning towards other types of plantations such as broom-grass, betelnut, vegetables, tea and rubber due to absence of proper bamboo markets, industries, transparent supply chains and institutional channels as well as permanent suspension of two major paper mills of Assam, one in Nagaon district and the other one in Silchar. The local folks have recommended and urged the government to establish institutions for promoting capacity-building and skill development of the communities in terms of entrepreneurship, marketing intelligence & technical know-how for synthesis of innovative and contemporary bamboo derived products. On top of that, there were unanimous opinions on seeking government interventions in setting up an industrial ecosystem that emphasizes on augmenting production, strengthening market, branding and generating economy by means of bamboo creations.

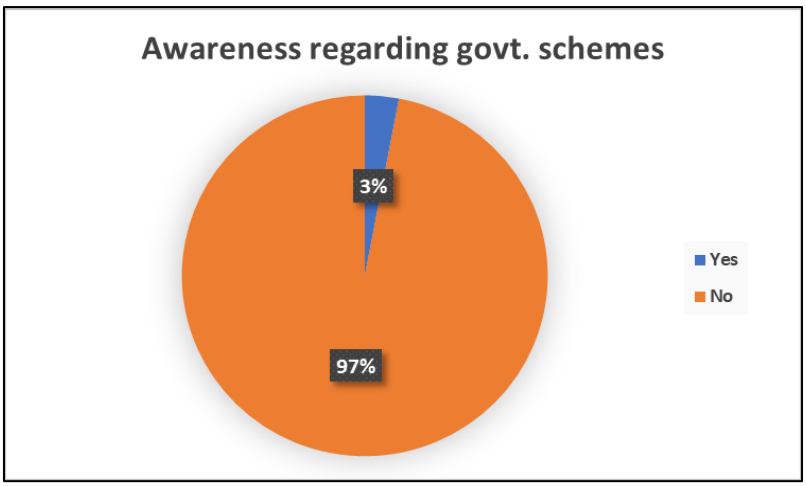

Figure 11: Awareness Regarding govt. Schemes

Conclusions

The present study highlighted the indispensable role, functional aspects and 'green gold' potential of bamboo in the socio-cultural lives and rural economy of the Karbi community, along with the various associated challenges and loopholes overshadowing the sustainable growth and development of the bamboo sector in the respective study area. An attempt was made to identify the potential ecosystem services of bamboo resources, majorly focussing on the provisioning aspects such as the socio-economic dependency of rural communities on bamboo resources and documenting the ethnic environment and local culture of the Karbi residents. In addition, various other essential attributes such as perception of the households towards improvement of the bamboo sector, traditional knowledge/belief system in terms of bamboo resource utilization, market accessibility and requirements, challenges in the supply chain mechanism, levels of awareness and knowledge regarding bamboo cultivation, propagation and management, infrastructure related issues, credit and finance-related facilities, tax structure, etc. were also incorporated and addressed in the study. Bamboo provides employment to 0.12 million people and has the potential of generating 80 million-person days of employment in the region (INBAR, 2016). In Assam, Bamboo holds tremendous scope in gathering capital of Rs. 8000 crores on an annual basis (Baishya & Baishya, 2022). Various stakeholders are working at national, regional, state, and local levels for planning, management, and development of bamboo resources in the North-Eastern region. With a substantial investment of Rs. 62 crores, a Bamboo Technology Park was constituted and launch in the Kamrup district of Assam with an intent towards manufacturing of upgraded and demand-driven bamboo goods as well as rendering the infrastructural assets to the bamboo entrepreneurs. However, there has been very limited progress and growth observed in the bamboo sector of the respective region, including Karbi-Anglong district of Assam as well. This has been mostly due to lack of proper coordination and management, connectivity issues, lack of proper infrastructure, supply chain loopholes & disruptions, research and

development related gaps, low productivity, discouraging taxes and policies, lack of credit facilities, manpower and skill development initiatives and precarious implementation practices of the government agencies (INBAR, 2016).

Acknowledgements

We thank the Karbi Anglong Autonomous Council (KAAC) for all their valuable assistance, interest and necessary consideration. We would also like to acknowledge the Research & Development Cell, Guru Gobind Singh Indraprastha University for providing funding support. In addition, we would like to express our gratitude to the faculty members of University School of Environment Management, Guru Gobind Singh Indraprastha University and the technical staff of North East Centre for Technology Application & Reach (NECTAR), Department of Science and Technology, Government of India for their encouragement and extremely important scholarly inputs.

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