

The Trends of Bamboo to Sustainable Development in Noklak, Nagaland

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Abstract: *Noklak is a district in Nagaland inhabited by the Khamniungan tribe. Geographical isolation and poor road connectivity have kept them in abject poverty for many years, and the population mostly depends on the bio resources that come from bamboo for their survival. Bamboo plays a dominant role in every aspect of life, beginning with the sharp bamboo blades prepared to remove the umbilical cord of a new - born baby until the dead are buried by erecting a bamboo fence at the burial ground. It has been noted that the maximum number of farmers are engaged in the production of bamboo - based articles; it is a successful enterprise for doubling household income and provides safety net. The region has tremendous potential for bamboo - related development activities, and therefore, addressing the problems of road connectivity and marketing will offer a pathway to drive people out of poverty. Bamboo provides a wide range of goods and services to rural communities, reducing their carbon footprint and creating an opportunity to advance many sustainable development goals.*

Keywords: Bamboo, Noklak, Poverty, Sustainability and Livelihood

1. Introduction

Nagaland, the land of festivals, is located in the extreme northeastern part of India, with Kohima as its capital. The state has a total area of 16, 579 square kilometers and is endowed with rich flora and fauna. It lies between 25°06' and 27°04' N latitude and 93°20' and 95°15' E longitude and has a population of approximately 19.79 lakhs. There are 16 administrative districts in this state. Noklak is one among them which is inhabited by the Khamniungan tribe. This region is mainly predominant by the cultivation of bamboo. Bamboo is a giant grass that is the world's fastest - growing land plant. It belongs to the subfamily Bambusoideae. With over 1, 600 species distributed across different regions of the world, bamboo is a critical resource for both people and the environment. It is a hardy and versatile species that is adaptable to a wide range of soils and climates, making it an accessible and abundant resource for communities in developing countries. One of the most significant ways that bamboo contributes to sustainable development is through its use as renewable resource and climate change mitigation. It can be harvested every 3 - 5 years without causing any harm to the plant or the environment.

Over the last decade, bamboo has evolved from being a raw material for basic goods into the material base of an increasingly diversified array of products. It is the basic natural resource that has helped mankind to survive and progress since primitive days. People use bamboo for clothing, food, shelter, and transportation. It has a tensile strength of 28, 000 pounds per square inch, which is higher than steel and is thus an essential material for structures that can withstand earthquakes. It consists of 50–70% hemicellulose, 30% pentosanes, and 20–25% lignin. These

are useful at all stages of development, such as when 30 - day - old shoots are used for consumption, 6–9 - month - old plants are suitable for making baskets, 2 - year - old plants are used for bamboo boards and laminating, and 3–6 - year - old plants are best for construction.

Bamboo is found extensively in all 16 districts of Nagaland (about 71 species, including a rare and unique species known as "Psrenoatachium"). About 8.96 million hectares of the nation's bamboo - growing stock have been calculated, with Nagaland accounting for 5% of the total. Bamboo has a profound and unique influence on life, and Naga's has a special ethnic bamboo culture. 80% of the population is dependent on agriculture and much of their production equipment and supplies are made of bamboo

So far, no detailed research has been done in this area focusing on bamboo, and therefore, the current study was carried out with the following objectives:

- Identification and listing of bamboo species in the region under research.
- Evaluating the usage of these bamboo species.

2. Area of the study

Noklak (26.2167N and 94.9919E) is home to the Khamniungan tribe with diverse habitat types, natural resources, culture, and traditions. The Khamniungans are a transnational tribe of Nagas, inhabiting mountainous regions across north - eastern India and northwestern Myanmar, one of the largest biodiversity hotspots in the world (Indo - Myanmar). Geographically, this area is divided into two different nations, but the origin, ethnicity, tradition, culture, and language are the same. There are as many as 200

Khiamniungan villages (Khamti, Lishi, Dhimanti, and Lahie district) in Myanmar and 44 villages (Noklak district) in India. The town of Noklak, being located on the border, works as a site of interaction between the two nation - states of India and Myanmar. Most people are reliant on bamboo for shelter, food, furniture, and cash income.



Figure 1: Map of Noklak district in Nagaland (Area chosen for the research)

Methodology

Data was gathered in the year 2021 and 2022 from different villages located under Noklak district. The primary tool used to gather the necessary information for this study was a questionnaire, to which the interviewed craftsmen had to respond right away. To facilitate better communication, the survey questionnaire was designed both in English and their local dialect. In addition to the questionnaire, direct conversations were also conducted with the respondents to obtain more detailed information. Furthermore, the author’s own observations and findings were also added during the data collection process.

3. Result and Discussion

Demographic features of the study area

There were 70 randomly chosen respondents in total, with 77 percent of them being men and the remaining respondents being women (Table 1). A whopping 38% of them were aged between 46 and 65 years; the oldest individuals tended to be the most knowledgeable, which may be due to their extensive experience in bamboo work or other related fields. The study also provided insight into the experiences of physically challenged individuals who have turned to bamboo work as a means of sustaining their livelihood. According to the findings, these people have remarkably mastered the art of bamboo work, reflecting their passion and dedication to the craft. The results indicated that men made up the majority of the respondents and that very few women were primarily engaged in producing value - added bamboo shoot products.

Table 1: Parentheses indicate the percentage value of gender role

Sex	15 – 25 (Years)	26 – 45 (years)	46 – 65 (years)	>65 (years)
Male, N=54 (77) *	6	18	22	8
Female, N=16 (22)	3	6	5	2
Total, N=70	9 (12)	24 (34)	27 (38)	10 (14)

Occupation of Respondents

The maximum number of farmers was involved in the production of bamboo - based products, followed by work - charged employees (Figure 2). It is considered as an effective enterprise for doubling household income. Most of the bamboo articles are made during lean periods in agriculture or whenever time allows. Farmers and work - charged employees reportedly view bamboo crafting as a safety net to support their families in times of financial difficulty, particularly when the harvest from the field is poor and they are not paid for extended periods. Despite having excellent skills, only 10% of the respondents took up bamboo crafting full - time. This is the result of poor marketing and difficult economic circumstances. The proportion of artisans who can make their living solely from their craft may increase if efforts are made to improve bamboo craft marketing strategies.

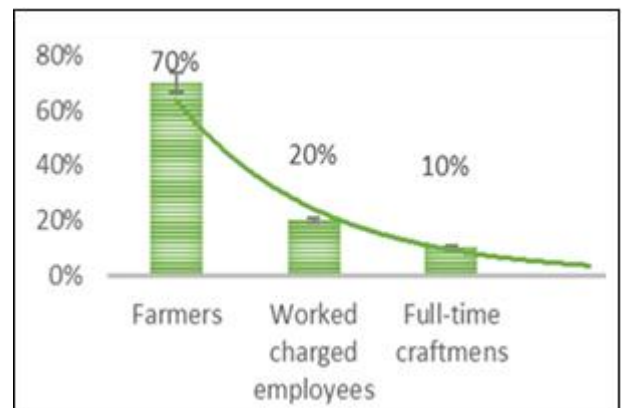


Figure 2: Occupation of the respondents in percentage

Identification of bamboo species

The land of Khiamniungan Naga is blessed with an abundance and variety of bamboo species (Table 2). Among the 15 species of bamboo listed, *Dendrocalamus giganteus* is the most prevalent (Figure 3). People continue to live in extreme poverty because of geographical isolation and poor road connectivity; they rely almost entirely on the bioresources available from bamboo for their existence and sustenance. The cultivation of bamboo in backyards and common areas in villages is a longstanding tradition, as it is known to serve as an effective windbreak. It is found that all available varieties of bamboo are utilized for both domestic and social needs.



Figure 3: *Dendrocalamus giganteus*

Table 2: Various species of Bamboo in Noklak District

Sl. No	Scientific name	Local name
1	<i>Dendrocalamus giganteus</i>	Ouhtheunyu
2	<i>Dendrocalamus asper</i>	JÜli uh nyu
3	<i>Bambusa tulda</i>	Ouhmio
4	<i>Bambusa oldhami</i>	Vaiouh
5	<i>Pseudosasa japonica</i>	Lei
6	<i>Bambusa multiplex</i>	Pok
7	<i>Melocannabaccifera</i>	Teuouh
8	<i>Bambusa balcooa</i>	Ouhshou
9	<i>Fargesiamurielae</i>	Lieh - e
10	<i>Dendrocalamus strictus</i>	Pioouh
11	<i>Dendrocalamus hamiltonii</i>	Ouh may
12	<i>Dendrocalamus latiflorus</i>	Ouhtsai
13	<i>Bambusa vulgaris</i>	Chiu ouh
14	<i>Arundinaria fargesii</i>	Teutso
15	<i>Bambusa nana</i>	Ta lÜa

**Figure 4:** Bamboo houses

Utilization of bamboo

The Khamniungan people have survived through the centuries with diverse and varied uses of bamboo. It plays a dominant role in every aspect of life, beginning with the sharp bamboo blades prepared to remove the umbilical cord of a new - born baby until the dead are buried by erecting a bamboo fence at the burial ground. Agriculture is primarily the source of sustainability, along with bamboo crafting. It was observed that bamboo has a wide range of applications for both humans and domestic animals. The occasional income from the sale of bamboo products is often used to buy rice from fair priced shops, avail healthcare services, and pay for children's education. In the research area, sustainable bamboo houses enclosed with a unique bamboo fence are home to most of the villagers (*Figure 4*). It is said that bamboo houses are simple to construct, durable for a lifetime, and resilient to natural disasters. Bamboo is what makes life easier for the poor, physically challenged people, and widows. The people in this region have an enormous wealth of knowledge on bamboo crafts that they have passed on to the younger generations after developing through their centuries - long method of trial and error. To make the necessary household items, each family has at least one member who is skilled in working with bamboo. It is a common building material for the tribal people because it is inexpensive and easily accessible to meet their many needs. It is used for flooring, roofing, windows, and doors. The shoots are consumed as delicacies and for medicinal purposes; they are high in dietary fibre and low in fat and calories. It can be eaten fresh, dried, fermented (*Figure 5*), or flavour - infused.

**Figure 5:** Fermented bamboo shoot

Fields and villages are connected by a substantial bamboo suspension bridge that spans a river. And from constructing the hall to decorating it, bamboo is extensively used in traditional festivals. Musical instruments of the Khamniungan Naga's are also made from bamboo. Farmers used bamboo pipes for domestic and agricultural purposes because they couldn't afford to buy plastic pipes. It is informed that variation in bamboo durability depends on the length of the culms, the thickness of the wall, the time of harvesting, and the bamboo species. It is recommended to harvest before sunrise, at the end of the rainy season and the beginning of the dry season, during the waning moon. Bamboo is used to construct temporary fishing barriers across rivers and to create a variety of fish traps that can be used to catch fish upstream and downstream in suitable locations, in fast - and slow - moving streams. For their high yield, these sites have been chosen for generations. The right to fish at a specific site is passed down through families. Bamboo has traditionally been used for sustenance only, but it has recently gained attention due to its potential to improve cash income generation. As a result, people started to produce a wide range of high - quality, innovative products for sale (*Figure 6*).



Figure 6: Bamboo Products

Marketing of the products

In this region, it is common for producers to sell their bamboo products directly from their homes. However, craftsmen get the chance to exhibit and sell their products at the annual handicrafts (Figure 7) and traditional festivals, where a lot of people congregate. Only about 7–8% of goods are sold through middlemen; they purchase the products and sell them house to house in the nearby towns. In cases where the buyer grows their own bamboo, the craftsman is invited over to make the products and is paid a daily wage. The demand for the product varies from season to season. For instance, paddy storage bins and baskets are in high demand during the post - harvest period.



Figure 7: Bamboo handicrafts and Fishing traps

Constraints in bamboo - based marketing

- Unsustainable harvesting
- Old production technologies and methods
- Transportation facilities
- Non - availability of good markets
- Commercialization of bamboo products

The majority of respondents stated that they face transportation challenges when marketing bamboo products. Due to poor road conditions, available transportation charges a high fare, preventing them from profiting despite their large production and availability.

4. Conclusion

Based on the present study, it has been found that the use of bamboo in Noklak areas gives the poor a chance at life. It is evident that there is an enormous wealth of knowledge on bamboo crafts among the people of Khamniungan, which has been developed through their age - long trial and error methods and passed on to the younger generations. A large number of populations under Noklak are usually illiterate, and therefore, bamboo crafting can be utilized as a potential sector for their employment. There is tremendous potential for bamboo - related development activities in the region; addressing the problems of road connectivity and marketing will offer a pathway to drive people out of poverty. Bamboo is providing a wide range of goods and services to rural communities, reducing their carbon footprint and creating an opportunity to advance many sustainable development goals.

5. Major Recommendations

- The cultivation of bamboo should be promoted in order to supply the variety of products needed for a modern lifestyle. Rhizomes are insufficient for plantations over a large area, so a nursery from culm cuttings or seed needs to be established.
- Clump management and harvesting methods should be disseminated to tribals in order to obtain maximum benefits from bamboo.
- Subsidy schemes under the National Bamboo Mission, India, if implemented correctly, can help alleviate poverty by providing the economically backward sections with the means to earn an income and become more self - sufficient.

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