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Indigenous knowledge and practices of *Thengal Kachari* women in sustainable management of *bari* system of farming

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The *Thengal-Kacharis,* belonging to the *Boro-Kachari* ethnic groups are one of the most ancient inhabitants of Assam with rich tradition and cultural history. The *bari* or homestead gardening has had great significance from the point of conservation, consumption and management of biodiversity. Women of this community have played a key role in sustainable use of *bari* bioresources through various practices and knowledge systems that have been passed from generation to generation. In the paper, the crops diversity and their arrangement in a *Thengal Kachari's bari* along with some the traditional practices followed in sustainable management of *bari*- bioresources have been discussed.

Keywords: *Thengal Kachari*, *Bari*, Northeast India, Bioresources, Traditional knowledge, Traditional farming, Preservation

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The Northeast region of India is a land of diverse people each with their own cultural tradition and nature-linked celebration. The *Thengal-Kacharis* are one of the many small ethnic communities belonging to the Indo-Mongoloid race with mythical ancestry. They are a clan of the *Bodo-Kachari* ethnic group. *Thengal-Kacharis* are one of the ancient inhabitants of Assam and have rich cultural history. The community is believed to have derive their name *Thengal* from an ancestor, who is said to have ascended to heaven leg foremost[1]. It is also speculated that the community served the *Ahom* Kings and wore a uniform consisting of a long shirt or *thenga* shirt touching their heels which might have led to the name Thengal[2]. Being one of the oldest inhabitants of this region, the *Thengal-Kacharis* have evolved various practices in conserving and sustaining the bioresources. Women of this community have played a key role in sustainable use of bioresources through various practices and knowledge systems that have been transmitted through generations.

The *bari* system of farming has evolved over the years in the Northeast India and has had great significance from the point of conservation, consumption and management of biodiversity. *Bari's* connote an operational unit in which a number of crops including trees are grown with livestock, poultry and/ fish production for the purposes of meeting the basic requirements of the rural household. These are ubiquitous landscape components in a *Thengal-Kachari's* home. The *bari* in such household lies alongside to the main household. A *batchor* or gate leads to the main house through a long footpath. A typical homestead comprises of extended family houses, vegetable and horticultural gardens, trees, bamboo shrubs, threshing grounds, livestock/poultry sheds, and ponds.

Methodology

The study was carried out on the Balijan gaon (No. 1), Jalukoni in the Jorhat district of Upper Assam. Interview schedule of a questionnaire was used to collect information from the rural women. The questionnaire was divided into four sections. Sections A dealt with the demographic variables, section B with the crops grown in the *bari's*, section C solicited information on the role of women in *bari* farming, while, section D solicited for information on the Indigenous Knowledge (IK) used in management of the *bari*. The sample consisted of 30 women. Data were collected from the respondents by personally interviewing them using a pre-tested questionnaire. Simple analysis of the data was carried out.

Results and Discussion

Majority (80%) of the respondents was married, 15% were unmarried and 5% widowed. This is

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expected as all respondents were adults and majority was around the age of 30-80 yrs old with experience and knowledge in running the household. The distribution of respondents according to educational level showed that 60% have gone through some formal education and 40% had no formal education. Among the literate, 58.2% had primary education and only 1.8% had secondary level education. The life expectancy of the women is 72.9 yrs. The age of the first child bearing is 16 yrs with an average number of 4.9 children per household. All the respondents stated that their main activities were home duties.

Structure and patterns of crops and their arrangement in *Bari*

Years of observation and experimentations have allowed the women of this community to develop a general *bari* structure with considerable diversity and flexibility that facilitates production of the major livelihood necessities. They have managed to select crops that are co-adapted and that give aggregated benefits. The *baris* have been designed to allow optimal harvest of solar energy through the strategy of fitting phenological classes and life forms together in space and time, and through niche diversification techniques. Multiple crops are present in a multi-tier canopy configuration. The leaf canopies of the components are arranged in such a way that they occupy different vertical layers with the tallest components having foliage tolerant to strong light and high evaporation demand and the shorter components having foliage requiring or tolerating shade and high humidity. Although the *baris* exhibit a general pattern, each garden is unique in its spatial and temporal structure, crop mix and arrangement, and overall design. Some crops are always planted in regular patterns, while others are planted wherever space is available.

Crop diversity is highest near homes and reduces with increased distance from the house exhibiting only few species at the extreme end of the garden. There is a small area encircling the main house that shows the maximum crop diversity usually represented by only one or two individuals thus allowing the maintenance of many species within a small space. Fragrance plants, spices, medicinal plants, vegetables, and others are observed in this zone. This part of the *bari* is easily accessed for instant use as fresh vegetables, herbs and condiments and as such under the direct domain of women, who take responsibility for the propagation, management, harvesting and post harvest operations of the produce. Banana, plantains, citrus were commonly present in the second zone while the third zones mostly exhibited arecanut, jackfruit and other tree species. Bamboos were ubiquitous in the *baris*. The list of crop plants commonly observed in the surveyed *baris* is presented in Table 1. Pisciculture is the common practice in these households. Fishes are generally reared in dugout ponds behind the main homestead. Traditional homestead gardens have been major sources of household requirements. An earlier study reported the home garden system of Cachar district of Assam[3]. Four vertical layers in home gardens in Sri Lanka were also reported[4].

Role of women in maintaining *Bari* farming

Results of the study indicate that women were the principal managers of *bari*. Women held deep knowledge on growth habit and utility of each plant, and they devised to allocate plants to make full use of limited space adjusting such plant's tolerance as against water logging, shade, direct sunshine, and drought. The plants were used for various purposes such as food, medicinal, sericulture, fuel, timber and cash crops. Although the men perform heavy tasks like hoeing and bed establishment, fence building, pond digging and tree harvesting, the women managed the day-to-day maintenance tasks like weeding, providing scaffold to climbers and creepers, pest and disease management and harvesting of produce like vegetables, spices and picking leafy vegetables, medicinal plants including processing, seed selection and storing. About 90% of the post-harvest operations of the *bari* produce was performed by women. They were also the primary caretaker of the livestock and poultry. Many of the elderly respondents who were no longer physically active continued to play an important role in passing down traditional knowledge, especially their understanding of the care and use of indigenous plants and pest control measures to the next generations.

Knowledge & practices in sustainable management of *Bari*-bioresources

The *Thengal-Kacharis* have an intimate relationship with nature and have evolved various rituals and *taboos* in harvesting and consumptions of produce from the *baris*. These have implications in sustainable use of resources. Bamboos are never

Table 1 — Some common plants in the surveyed *Bari*

Species	Family	Local name	Uses
Areca catechu	Palmae	*Tamul*	Masticator, timber, leaf for fencing
Artocarpus heterophyllus	Moraceae	*Kaathal*	Fruit, vegetable, timber, fodder, cash crops, agricultural implements
Terminalia chebula	Combractacae	*Som*	Silk worm rearing
Mangifera Indica	Anacardiaceae	*Aam*	Fruit, timber
Garcinia cowa Roxb.	Guttiferae	*Kuji-thekera*	Fruit, medicine
Baccaurea sapida	Euphorbiaceae	*Leteku*	fruit
Emblica oficinalis	Euphorbiaceae	*Amlakhi*	fruit
Spondias pinnata (L.f.) Kurz.	Anacardiaceae	*Amora*	fruit
Dillenia indica L	Dilleniaceae	*Ou tenga*	Fruit, medicinal, small timber
Aquilaria malaccensis Lamk.	Thymelacaceae	*Sansi*	Fragrance oil
Melocanna baccifera (Roxb.)	Poaceae	*Muli*	Construction
Musa sp	Musaceae	*Kol*	Fruit, religious, cash crops
Musa balbisiana	Musaceae	*Bhim Kol*	Fruit, religious purpose
Citrus limon (L.) Burm.	Rutaceae	*Nemu*	Fruit, medicinal, cash crops
Citrus maxima	Rutaceae	*Jambura*	Fruit, fuelwood, cash crops
Citrus medica L. Citron Jamir	Rutaceae	Rababtenga	Fruit, medicinal
Citrus reticulata Blanco	Rutaceae	*Komla*	Fruit, cash crops
Capsicum annuum	Solanaceae	*Jolokia*	Spice, cash crops
Alocasia indica	Araceae	*Man Kosu*	Vegetable
Colocasia antiquorum	Araceae	*Kosu*	Vegetable
Curcuma longa L.	Zingiberaceae	*Halodhi*	Spice, cash crops
Zingiber officinale	Zingiberaceae	*Ada*	Spice, cash crops
Benincasa hispida	Cucurbitaceae	*Chal Kumra*	Vegetable
Lagenaria siceraria	Cucurbitaceae	*Lao*	Vegetable
Cucurbita maxima	Cucurbitaceae	*Ronga lao*	Vegetable
C. minimum	Solanaceae	*Dhan Jolokia*	Spice
Momordica cochinchinesis	Cucurbitaceae	*Bhat kerela*	Vegetable
Luffa acutangula.	Cucurbitaceae	*Bhul*	Vegetable

felled on Tuesday and Saturday as well as on every new moon day. Rattan is also not harvested on these days. The reason behind this practice is to promote judicious utilization of these important resources. Banana inflorescence is a popular vegetable in this part of the region. However, it is also not harvested on Tuesdays and Saturdays. The respondents also stated that they do not pick *Diplazium esculentum* (*Dhekia*) – leafy vegetables during the onset of autumn. The plant begins to sporulate for onset of a new cycle and an abstinence from plucking the leaves would be way to allow propagation. Fish is not consumed during the monsoon months as it is the fish breeding season and the practice ensures the survival of egg laying fishes. Many of the vegetables belonging to the cucurbit families and green leafy vegetables are not harvested during the forenoon. The respondents sated that they do not enter the *bari* or pluck betel vine leaves during the menstrual cycle. It was also a taboo to pluck *Ocimum sanctum* leaves by women. It was observed that many of the plants are worshiped or have been given religious importance. *Sijou Goch* (*Ephorbia nerifolia*) is considered as to be a holy tree by the *Thengal-Kacharis*. Similarly, other trees like *Musa balbisiana* (banana), *Ficus religiosa* (*peepul*), *Ficus bengalensis* (banyan), *Mangifera indica* (mango), *Ocimum sanctum* (sacred basil), *Cynodon dactylon* (Bermuda or *durva* grass), *Aegle marmalos* (wood

Table 2 — Traditional practices of crop cultivation and management by *Thengal Kachari* women

Practices	Methods	Crops	Remarks
Plant selection	Seeds are selected and collected from healthy, heavy bearing mother plants showing good characteristics	Ash gourd, ridge gourd, bitter gourd, coconut, arecanut, pumkin, leafy vegetables,	Good planting material for propagation
Planting time and method	Planting during full moon	Banana, Areca, coconut	Believed to ensure clear fruits
	Planting during rainy season	Banana	Ensures availability of water
	Salt is also applied to the soil during seed planting of fruit trees	Coconut	To felicitate easy penetration of the roots.
	To plant banana seedlings, pits are dug at a depth measuring a length a little more than the fingertip to the elbow joint of one hand	Banana	Good growth
	Planting arecanut seedlings in the same direction as it was in the nursery bed	Arecanut	Prevents trunk splitting
Soil management	Fallen tree leaves and farm refuse material are applied to the base of plants	Banana, Areca	Conserves moisture, increases soil fertility
	Kitchen waste along with refuse water are applied to plants	Banana	Increases soil moisture and fertility
	Application of common salt	Coconut, banana	Increases fertility by supplying sodium that also substitute for potassium in potassium deficient soil
	Composted FYM, kitchen waste and farm refuse are applied to plants	vegetables	Increases soil fertility
	Khori goch (*Dhainsa*)	*Bari* soil	Conserves moisture, increases soil fertility
	Fish scales are applied to the base of plants	Vegetable of gourd family	Supply phosphorous
	Fish cleaned water are applied to the base of plants	Vegetables and citrus	Moisture and fertility
	Ash are applied to the base of plants	Banana, vegetables	Enhance nutrient status particularly, phosphorous
Irrigation	Pits are dug in the ground to collect rainwater for irrigation during dry spells		Source of water during dry season
	Earthen pitchers filled with water are placed in fruit orchards to allow gradual seepage of water from the pitcher into the soil.	Vegetable and fruit orchards	Maintains soil moisture and also works as a humidifier for the environment
Crop protection	Wood ash is sprinkled on vegetable crops.	Vegetables	Wards off pest
	Fish cleaned water are applied to the base of plants	Citrus	Wards of citrus trunk borer
	Smoke is generated at the base of fruit trees	Jack fruit, mango	Prevents pest infestation of fruits
	Introducing predaceous red tree ants nest into fruit orchards	Citrus	Ward off borer infestation
	Common salt is applied to the base of plants	Banana	To ward of snails and slugs.
	Lightening earthen ware lamps	Rice field	Wards of insect pest
	Application of kerosene oil to the fruit tree trunks	Citrus	Wards off shoot stem borers.
	Catapults and drum beating	Fruit orchards	Ward of birds and monkeys that swarm the homestead during periods of fruiting/ crop maturity.

apple) are also associated with many religious rituals.

Women have developed a sustained interaction with the nature through their daily household chores. They depend on land and water for food and nutritional security, medicines, fuel wood, and other products that are used for household subsistence[5]. Such sustained interaction with ecological systems has enabled the women to acquire knowledge both about the environment and about the natural resource base and its uses. These knowledge and information about natural and biological resources and about the use of sustained practices and conservation techniques are nurtured and disseminated[6]. Conservation of the elements of biodiversity through various sacred uses of nature such as tree and/or animal worship, and observing taboos on harvesting and hunting of plants and animals is characteristic of many indigenous communities in India[7-10].

Preservation and storage of produce and seed

Women are the seed preservers in agrarian society. Seeds of vegetables like lady finger, brinjal and chilies are removed from mature fruits and are kept above the fireplace called the *dhua chang* to dry and prevent pathogen attack. Seeds of gourd families like cucurbits, ash gourd, pumpkin, cucumber seeds are removed from ripened fruits and allowed to dry in the sun. They then stored within the bamboos. A small slit is made in one end of the bamboo and seeds are inserted into hung in one corner of the house. Paddy and sesame seeds are sun dried and kept for the next cultivation. Sweet potato, ginger, and other tubers are kept in the shady ground and preserved.

Vegetables such as sweet pumpkin and *chal* and sweet pumpkin, are allowed to ripen to the point where they know it can be stored for a year. These are then harvested and stored in the *dhua chang* till consumption. Surplus fishes are fermented to make *Sukati* for consumption during the lean season. Ripened *cowa* (*Garcinia cow)* are cut into slices, sun dried and stored for medicinal use. Similarly, chebulic myrobalan (*Terminalia chebula*), *anola* (*Eblica officinalis*) are also harvested; sun dried and stored as common medicine. *Areca catechu* nut is stored by burying them in the pits dug on the soil. The pits are lined with banana or palm leaves and filled with nuts and then covered with soil. This increases the shelf life of the nuts and they can be consumed till the next harvest season.

Traditional practices of crop cultivation and management

As with the other ethnic communities, the *Thengal-Kacharis* have also developed, evolved and nurtured a variety of practices associated with crop cultivation. Many of the practices have resulted due to the women's observation and experiences (Table 2).

Conclusion

Northeastern India is a mega-cultural landscape with over a hundred linguistic ethnic groups, each with their own cultural tradition and nature-linked celebration. The region by the virtue of its location is also is one of the two mega biodiversity hot-spot of India. It has one of the richest repositories of genetic diversity[11]. This diversity is reflected in the *bari* system of cropping wherein the women take active role in managing and its sustainable use. The paper shows that the *Thengal-Kacharis* practice certain religious beliefs and rituals that are aimed at conserving nature by judicious use of bioresources and maintaining the ecological balance in nature. *Baris* provide vegetables, fruits, medicinal plants, spices, and even material for clothing, timber and other house construction materials. However, over the last decade, this traditional practice has considerably declined as tea plantations and agro-forestry that fetches higher remunerative have taken over. As a result the diversity of plants grown in homesteads has declined substantially, with negative effects on both people and the environment[12].

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