

Exploring the Rich Flora and Fauna of North East India

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Abstract—India is empowered with a wide range and embellishing coverage of flora and fauna. The cultural distinctiveness and traditions contribute to the growth and conservation of its rich natural resources. This paper aims to study and understand the significance of the flora and fauna and their co-relation life styles and mental health factors. An attempt is made to juxtapose the diversified factors which precipitate the relationship of mankind with this aesthetic richness of flora and fauna. The paper explores the importance of North-East culture, flora and fauna, medicinal plants, farmlands, food styles, prevention of illness and Health Promotion. Over the years, people of North-East India have been surviving with nature and developed location specific traditional ecological knowledge system tuned to culture and custom. The survival strategies of these inhabitants are such that they are free from economical greed resulting into tampering these natural resources and the cultures and customs are nature friendly which motivates these inhabitants to avail such natural resources in a very conservatory manner. The implication of this paper is to motivate people to visit and explore these rich environmental resources and understand how they can contribute to our life style habits and wellness

Keywords: North-East, Flora-Fauna, Mental Health, Medicinal plants, Ethno-Botanical, Avifauna.

1. INTRODUCTION

Cultural richness and traditions of North-East makes it so intriguing and compelling that it becomes imperative that we as psychologists talk about its contributions to humanity and wellness. 21st century, the whole nation is experiencing hue and cry for the need of infrastructural and economical development with a very negligible awareness for the need of social and environmental development. But this notion also includes within itself that part of it which is rarely recognized by the mainstream population, perhaps because this region holds very different social scenario not conforming to those majorly held notions. North-east India (NE India) forms a distinct region with its language, customs and

natural resources. Arunachal Pradesh, Assam, Meghalaya, Manipur, Mizoram, Nagaland, and Tripura form the seven sister states of India. Starting straight from environmental richness, this region is filled with a rich juxtaposition of diversities of flora and fauna largely reflects the richness of biodiversity of the region which makes it so unique.

2. NORTH-EAST CULTURE

This North-East region of the nation is comprised of eight states which harbour more than 180 tribal communities of the total of 427 tribal communities found in India which is about 40% of the total tribal communities [11]. This region marks a specific diversity of culture, ethnicity and is home of a large number of ethnic/tribal people in India. Tribal people are the ethnic communities who live in harmony with the nature and strive a balance between using and conserving the natural resources. The nation is empowered with over 53.8 million tribal people inhabiting in 5000 villages dominated by forest of tribal community comprising 15% of the total geographical area of land masses which represents one of the greatest emporia of ethno-botanical wealth. [10]. A large part of this region is botanically underexplored or even unexplored [6,5]. The tribal communities have diverse food habits, culture, customs, traditions, religion and hold differing communal institutions and knowledge which determine the access, usage and conservation of such resources.

3. FLORA AND FAUNA OF NORTH-EAST

The richness of the region's avifauna reflects the diversity of habitats associated with a wide altitudinal range. The region is rich in medicinal plants and many other rare qualified species. Its high endemism in higher plants and vertebrates and its diversities have led to its recognition as the biodiversity hotspot. Northeast region has been

able to retain a significant proportion of this biodiversity and enjoy its goodness possibly due to the long years of isolation from the central government but it is now under immense pressure to unleash its resource for economic development which in turn will lead to the nation's desired economical development at the cost of its goodness leaving with irreversible damage. North-east states of India are one of the richest repositories of medicinal plants and flora and fauna of diversified range. The biological diversities and variability of ecosystem are used, managed and conserved by the traditional and ethnic communities through their informal and religious institutions which are directed towards the conservation of natural resources.

3.1. Forest

The forest confines up to an evaluation of 1000 m altitude with heavy rainfall and humidity and are highly rich in floral diversity. Such forest with an average rainfall coupled with relatively humidity are confined to the foot hills of Sikkim, Arunachal Pradesh comprising of Kameng, Subansiri, Lohit, Tirap District, Kakoi and Dulong reserved forest in North Lakhimpur district, parts of Cachar District, the western and north-western parts of Nagaland and Manipur forest areas adjacent to Burm, southern and Northern slopes of Meghalaya and Dharamnagar, Kailashahr, Belonia and Sadar Sub-division of Tripura. The top canopy of vegetation in these forest are composed of trees species like *Ailanthus integrifolia*, *Atrocarpus chama*, *A. heterophyllus*, *Castanopsis echinocarpa*, *Cinnamomum glaucescens*, *Dipterocarpus retusus*, *Duabanga gandiflora*, *Mesua ferrea*, *Shorea assamica* etc. Besides tall trees small trees or shrubs like *Acacia sinuate*, *Camellia caudate*, *Coffea khasiana*, *Maesa indica*, *Mimosa himalayana*, *Murraya paniculata*, *Solanum kurzii* etc and herbs like *Alpin nigra*, *Costus speciosus*, *Curcuma species*, *Hedyotis auricularia* and species belonging to the families *Acanthaceae*, *Asteraceae*, *Balsaminaceae*, *Begoniaceae*, *Oxalidaceae*, *Poaceae* etc are seen flourishing in these forests.

3.2. Grasslands

The grassland met within this, the reserved forests of Mothanguri, Orang as well as in the foothills of Mikir hills may be termed as secondary, arrested as a sub-climax stage due to intensive operation of biotic factors, combined effects of frequent heavy floods, forest fires whereas the extensive grassland of Kaziranga is an edaphic climax conditioned and influenced by the wide

swampy area consisting of several stagnant pools. The principal components of the grassland are grasses, bamboos and ferns. The prominent tall grasses are *Arundinella decampetalis*, *Arundo donax*, *Imperata cylindrica*, *Phragmites australis*, *Saccharum griffithii*, *S.spontaneum*, *Themeda villosa*, *Thysanolaena maxima* etc which extends over several kilometers and provide a suitable habitat for Rhinoceros. Since there are some rare species of plants which have been used over generations for medical purposes, hence the paper will now focus on the relevance of these plants and their contribution in health care practices.

3.3. Orchids and Flowers

North-east India occupies 7.7% of India's total geographical area supporting 50% of the flora (ca. 8000 species), of which 31.58% (ca. 2526 species) are endemic. The region is rich in orchids, ferns, oaks (*Quercus* spp.), bamboos, rhododendrons (*Rhododendron* spp.), magnolias (*Magnolia* spp.) etc. Orchids, believed to have evolved in this region, form a very noticeable feature of the vegetation here. Of about 1331 species of orchids, belonging to 186 genera reported from India; North-east India sustains the highest number with about 856 species. Amongst them, 34 species of orchids are identified among the threatened plants of India and as many as endemic to different states of this region [4]. Notably, some orchids species which are native not only to this region but also to the home states in which they are distributed especially in Sikkim and Arunachal Pradesh Himalayas, the Naga and Manipur hills, the Lusai- Mizo hills and Khasi- Jaintia hills [9]. These are: *Dendrobium spatella*, *Dendrobium parviflorum* and *Luisia macrotis* from Assam; *Vanda coerulea* and *Dendrobium palpebrae* from Arunachal Pradesh; *Renanthera imschootiana* and *Cymbidium tigrinum* from Nagaland; *Anoectochilus crispus*, *Cymbidium eburneum*, *Habenaria khasiana*, *Liparis deliculata*, *Paphipedilum venustum*, *Taeniophyllum khasianum* and *Tainia khasiana* from Meghalaya. *Renanthera imschootiana* from Tripura; *Dendrobium palpebrae* from Mizoram; *Ascocentrum ampullaceum* var. *auranticum*, *Epidendrum radicans* and *Vanda stangeana* from Manipur; *Calanthe whiteana*, *Cymbidium whiteae* and *Vanda pumila* from Sikkim [8]. These are 600 species of orchids in Arunachal Pradesh alone- the highest number in any state (377 epiphytes, 160 autophytic terrestrials, about 20 saprophytes). Major epiphytic genera include *Aerides*, *Arachnis*, *Bulbophyllum*, *Coelogyne*, *Dendrobium*,

Cymbidium, Eria, Cleisostoma, Rhynchostylis, Vanda etc. Most of the epiphytic orchids are ornamentals. In the tropical valleys of Arunachal Pradesh, one can find cascades of colourful flower-spikes of *Rhynchostylis retusa*, *Aerides odorata*, *A. williamsii*, *A. rosea*, *Cymbidium pendulum*, *C. aloifolium*, *Dendrobium aphylla*, *D. nobile*, *D. moschatum*, *D. fimbriatum* etc., loaded on tree trunks during spring which add beauty to the surrounding wood. In sub-tropical hill forests, bunches of "pineapple orchids" the *Dendrobium densiflorum*, *D. giganteum*, *D. grandiflorum*, *D. eburneum*, *D. mastersii*, *Vanda coerulea*, *Renanthera imschootiana* (red vanda), *Coelogyne* etc., greet the onlookers. The pink flowers of *Anthogonium gracile* found on the cut ends of rocks and edges carpet the exposed areas adding beauty to the landscape. Among terrestrials, *Acanthephippium*, *Arundina*, *Anoectochilus*, *Calanthe*, *Phaius*, *Paphiopedilum* are common. Amongst them, *Arundina graminifolia*, the "bamboo orchid" is normally seen grown in the open sunny areas amongst grassy patches in the foothills. In the thick forests, *Anoectochilus* and *Geodorum*, popularly referred to as the "Jewel orchids" group having beautifully designed velvety leaves. Arunachal is the home state of rare and endangered Lady's Slipper orchids, *Paphiopedilum* species viz [4].

4. MEDICINAL PLANTS

Ethno pharmacology is the term used to define the scientific study of substances used medicinally, especially folk remedies, by different ethnic or cultural groups. Ethno pharmacological relevance is the significant information about the ethno medicines used by traditional healers. North-east region of India is accredited with abundance of ethno-medicines and due to the rapid erosion of traditional knowledge about the same, need has arisen to document this enormity, their preparation and associated quality [2]. Some of the ethno medicines used by traditional healer in north-east and especially in Assam are mentioned below.

4.1. Thyme Leaved Gratiola or Brain Tonic

Generally known in Assamese as *Brahmi Haak* and scientifically known as *Bacopa monnieri* (L) Pennell. This is a well known memory booster herb used traditionally in India. This is a evergreen, juicy and fleshy herb green generally on moist ground. The leaves are small, fleshy and roots are found growing at the nodes. The leaves taste bitter and are known to facilitate as brain tonic and other significant qualities. This herb caters better when

consumed at earlier stage. Various other qualities due to which cognition and sleeplessness related issues are dealt using this herb are memory booster, sharpening of concentrating power, reducing sleeplessness etc.

4.2. King Tonic

Generally known as *King Tonic*, *Moon Creeper* and *Chinese Moon*, this medicinal plant is usually known as *Vedeilota* in Assamese is available at almost every gardens of Assam. Scientifically known as *Paederia Foetide* Linn is a popular edible plant used by the tribal community of North-east India. Different tribal communities of Northeast to Southern part of India use the plant as a vegetable and also use to treat different stomach disorders like diarrhea and dysentery, stomach swelling, to clean stomach, gastritis, in loose motions, indigestion, abdominal pain etc. The leaf is also used as an anti ulcer agent. Methanol extract at a dose level of 100 mg/kg and 200 mg/kg body weight showed 72 and 78% ulcer protection when compared to negative control.

4.3. Indian Pennywort

Also known as *Manimuni* in Assam which is scientifically known as *Centella Asiatica* (L) Urban. *Tiny Manimuni*, *large Manimuni* both these types of *Manimuni* are available almost everywhere in Assam. Surfaces and lands which are wet and moist are healthy for *Manimuni* to grow. This plant is grown easily in surfaces and lands which are very fertile in mature and which are exposed to sunlight. Indian pennywort is enriched with abundance of medicinal values. This herb is native to India and grows in tropical swampy areas. It grows near river, lake, canals, pools, ponds, agricultural lands, wetlands etc. it is rich in iron, calcium, vitamins A and C and consists of many mineral salts. It also contains blood requiring components. It greatly reduces the body heat and makes the body relax and cool; it increases hemoglobin level in blood and helps in anemic conditions. It activates neurons and nerves in the brain and increases the memory power. It increases eye sight and recovers from eye- irritation, and related problems. People suffering from elephantiasis can wrap around the plant paste to reduce the severity. It boosts Memory power, cures fever, removes strain on teeth, cures skin diseases, helps recover from fatigue, remedy for cold and asthma, cures anemia, decreases libido, treats insomnia, for cardiac disease, cures jaundice, curse diabetes, reduces severity of tumors etc.

5. FARMLAND

In spite of population explosion, it is possible to substantially augment the carrying capacity of farmland, doubled or tripled the food grain production and rapid industrialization in an attempt to contribute towards economic enhancement and change the quality of life of the people of North-East region of India. The region forms 7.8% of the total land area and about 4% of the total population of the country. More than 70% of total geographical area of North-East is covered by hills and about 3 million hectares is estimated to be under soil erosion hazard as a result of practice of jhum cultivation. In Assam alone 83.2 % of area is suffered from erosion of slide (35.3 %), moderate (37.7 %), severe (10.0%) and very severe (0.3%) intensity [8]. Improvement of soil quality, conservation and fertility is one of the main components of low income region and specially those regions where agriculture and harvesting plays as the breadwinner occupation. Farming is the most ancient and indigenous occupation this region ever witnessed and is held by generation to generation. This occupation holds various cultural, traditional and religious connotations apart from being an economic facilitator. Traditionally farming is the mainstay of people of north-east but the agro-based economy fails to flourish and facilitate enough to the economic sector of the region due to lack of proper involvement and utilization of technological aids. Farming as the sole and spearhead occupation of this region enjoys the special provision being the most feasible occupation as the region is one of those regions which are humid in nature. Such climatic characteristics of the region make the place most amicable platform where farming can be practiced effectively. Due to this agrarian relevance of the region, the inhabitants or the practitioners of the occupation are undoubtedly nature lovers and therefore try to direct their every activity to protect and conserve the nature. These plantation crops are high-value crops of great economic importance and provide huge employment opportunities, especially to the women throughout the year. The sub-tropical climate of this region is extremely favourable to the cultivation of many plantation crops. Among the three important crops viz- rice, tea, coffee and rubber. Assam is the largest producer of tea in India (about 53 % of total production). Its share in the region is about 96.8 % of area and 98% of production. The productivity of tea is about 1850 kg per hectare. The monoculture in small holdings is a nightmare during the

year of slump and epidemic of pest and disease. The organically grown products have been gaining popularity worldwide and fetching premium prices both at the domestic as well as international markets. Since the virgin soil in the hill areas is favourable for tea cultivation, the natural production conditions in the North-East India could be highly gainful in the production of user-friendly tea. On the account of organic matter and other plant nutrients in these soils, the plantation crops can be grown organically with minimum use of agro-chemicals. Due to low usage of these agro-chemicals which are highly toxic to a fully functioning human anatomy, these inhabitants are not vulnerable to those diseases which are the resultants of these toxic agro-chemicals. Fish have been harvested from rice fields as an additional crop since ancient times. Biologically, rice fields can be considered as agriculturally managed marshes, which remain dry for varying periods of time during the year. Physically, the aquatic phase has varying water depths according to the land topography and local rainfall patterns and water tables. In its flooded state, these rice fields form a rich and productive biological system which can produce a crop of aquatic organisms for both plant and animal, which is dedicated for human consumption [3]. The ecology of their rice fields in the region is quite diverse, but can be divided primarily into upland, lowland and deep water rice ecosystems. In this region fish crop is traditionally raised only from paddies of rain-fed lowlands. All the states of North-eastern India lie in a heavy rainfall zone and therefore a longer aquatic phase is possible in these areas than in rain-fed low-lying rice fields. Harvesting of the rice starts in November-December after the recession of floodwater at the end of the wet season. In Barpeta District of Assam, this is a very common system among the local tribal and fishers for collecting fish and other aquatic resources from the paddies [3].

5.1. Kitchen-gardens

These are well-established land use systems which may be defined as 'small-scale, supplementary food production system, by and for the household consumption which is not directed to economic purposes'. These are identified as important social and cultural reservoirs of day-to-day consumption by the household. These home-gardens provide food, fuels, shades, ethno-medicines and fulfil other domestic needs which are essentially self-sufficient for the household. The social relevance of these gardens is that the

products of these gardens are used as gifts to exchange as token of social gesture. These kitchen gardens play an important part of healthy lives as they are harvested using minimal agro-chemicals.

The largely practiced tradition or culture of this agrarian society is seen majorly in the festive season of this region which is termed differently from state to state within the region. These festivals are largely inspired by the agrarian culture and agrarian activities which are directed towards harvesting, fertility of the land, cultivation and conservation of the nature. These festivals are by and large celebrated in the months of April and May. This is the spring period when crops grow in abundance and lands are most fertile.

This agrarian occupation is the largest contributor to the economy of the state. Plantation of North-east India provides employment to a large number of populations including the tribal population which is largely ignored by the mainstream population. Roughly about 7 lakhs of workers are found to be working in the tea plantation of North-Eastern region. These workers belong to various tribal communities of other part of the nation such as Bihar, Madhya Pradesh, Orissa and Madras. Due to scarcity of workers in this region, employers recruit workers from such a long distance.

6. FOOD STYLES OF NORTH EASTERN TRIBES

Utilization of plants since ancient times for various needs of human kind represent a long dated back relationship of human kind and environment. Among these needs food and eating habits plays a significant role. Over the decades, traditional cultures over the world have learnt how to use plants and environment and identify their medicinal relevance in an attempt to fight back diseases and illness induced by nature. A number of exemplar of such traditional adaption is evident in growing number of literature being done by researchers over the world. North-east India is endowed with wide spectrum of biodiversity in plant genetic resource, and represents an important part of Indo-Myanmar diversity hotspot one of the 25 global bio-diversity hotspot recognized currently. It represent rich flora and many are accredited with medicinal value [14]. North-east India is a centre of diverse food culture comprising fermented and non-fermented ethnic food and alcoholic beverages. More than 250 different types of familiar and non-familiar food are identified which hold ethnic relevance of this region which includes: various types of vegetables, leaves,

bamboo, fish, milk, soybean, rice and rice products, locally brewed alcohol etc. The food habits of the inhabitants differ from place to place but overall the region holds uniformity in the same. The eating frequency of the region is generally thrice a day in a gap of near about 5 hours which metabolize the body with enough energy to be able to continue with the domestic manual work. As already discussed about the carload of avifauna available in this region, a good consumption of raw food in general is comprehensible. Food which are cooked are limited to boiled which considered healthy are consumed specifically by elders and children. Rice is the staple food. Though mainstream Indian loves spices, this part of the nation add dried fish, fermented fish, fermented soya etc for flavour in their curry.

7. PREVENTION OF ILLNESS AND HEALTH PROMOTION

Evidence is mounting that in several respect people are getting aware of the need to prevent disease and promote health in contrary to ailments of diseases. People around the world are becoming healthier, however a substantial number of them continue to experience increasing prominence of morbid diseases and visits traditional healers or doctor in an attempt to cure the same. And those that are not ill in a medical framework are not well either in the sense that they are not utilizing their maximum potentials, enjoying wellness in their day-to-day life activities or maintaining their high levels of energy. Although India has made a large progress in health infrastructure under NRHM, the improvement is quite uneven across the states with large-scale inter-state variation [7, 5 & 1]. North-east India is that part of the nation which is among the least developed medical advance with extremely limited medical services in many rural and backward region. In spite of the backwardness in the aspect of medical facilities and healthcare realm, this region is overwhelmed with a wide scale of population with health care promotion and illness prevention mentality. Various native traditions and aboriginal activities which are embraced by generations to generation with religious and at the same time scientific phenomenon concept and notions attached to it cater to these indigenous people among whom the awareness of health promotion is largely held. The rural health-care sector in the north-east region suffers from shortage of well trained health workers; be it specialist doctors, nurses or other health workers. Although the positions of various cadres of

health workers are authorized, most of them are still vacant in majority of the states, precipitating the under-utilization of facilities available in the existing health and eventually closure of those facilities [12]. Assam and Arunachal Pradesh have very rich tradition of herbal medicines used in the treatment of various ailments. Tribal communities practice different types of traditional healing practices. [13].

Awareness regarding promoting health and prevention of illness are not confined to physical aspect but also entails social and mental health. Various social issues such as drought or infertility of the lands owned and farmed by the inhabitants, due to which the economy of the households falls down majorly specially during the dry seasons and during the period when this region gets submerged underneath the flood, such social issues are attempted to address by the traditional healers and the elder-most person of the village. These periods are addressed beforehand as the inhabitants are aware of the scarcity which is followed by these adversities. These adversities also bring along with it various physical as well as mental issues such as depression, anxiety disorders, possession etc. Practices by these healers are attempted to prepare the inhabitants to face the adversities in a way which could lead them survive the issues and suffer less. Such awareness is evolutionary. These evolutionary changes are leading to a more balanced scenario which depicts a scientific system of survival among natural calamities.

8. CONCLUSION

Over the years, people of North-East India have been surviving with nature and developed location specific traditional ecological knowledge system tuned to culture and custom. The survival strategies of these communities are subsistence in mode with the absence of the greed of destroying the biodiversity. This ecological awareness of these communities makes them unique in the sense that the need to make money destroying the biodiversity finds no place and hence maintains the uniformity of economical baseline of these communities. Indian economy is pre-eminently agrarian and North-east region is no exception to it. Agriculture occupies a key position in the economy of this region because of its contribution to overall economic growth through supplies of food, raw materials and export; source of livelihood for over 70% of tribal an aboriginal populations and providing a large market for non-

agricultural goods and services [8]. Here, the staple occupation is cultivation and the customs and traditions of this region are overwhelmingly influenced or encouraged by this occupation. For example, people over here are very much connected with nature and hold a great degree of reluctance to destroy nature leading into a fatalistic belief. Where the whole nation are exchanging flower bouquets as a kind of desired social gesture, people in northeast comply with same social gestures with a twist in pattern such that they prefer to gift flower plant in order not to dissociate the flower from its native and encouraging the receiver to practice pro-environmental activities. As cultivation is the stable occupation and the relevance of it is identified and respected by everyone irrespective of their age, social status, economical status and occupation from this region, farmers find themselves occupying the most vital place in the hearts of this population. Not only cultivation and farmers, but also other kinds of occupation find themselves equally dignified.

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