

NON-TIMBER FOREST PRODUCTS (NTFPS) FOR SUSTAINING LIVELIHOOD IN NORTH EAST OF INDIA

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The North-East part of India is a rich source of natural resources. The North-Eastern region of the country comprising eight states, namely Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura is endowed with rich forest resources. Of the total forest area of around 68 million hectares in India, the North-Eastern states account for over 17 million hectares, roughly one-fourth of the forest area of the country. All the states of North-East India, with the exception of Assam, have 50–80 % of their area under forests. High temperatures, combined with heavy to very heavy rains, have stimulated the growth of forests at lower levels (Dikshit *et al.* 2013). The region which constitutes only 7.98 per cent of the geographical area of the country, accounts for nearly one-fourth of its forest cover. According to data made available by the India State of Forest Report 2015 the total forest cover of the region is 171,964 sq.km, which is 65.59% of its geographical area in comparison to the national forest cover of 21.34%.

Non-timber forest products (NTFPs) are any product or service other than timber that is produced in forests. They include fruits and nuts, medicinal plants, resins, essences and a range of barks and fibres such as bamboo, rattans, and a host of other palms and grasses. Non-timber forest products (NTFPs) are goods of biological origin other than timber from natural, modified or managed forested landscapes. The NTFPs can also be referred to like all the resources or products that may be extracted from the forest ecosystem and are utilised within the household or are marketed or have social, cultural or religious significance. Globally, more than a billion people depend directly on forests for their livelihoods and the remaining six billion of us depend on forests for a variety of economic, social and environmental benefits (Pandey *et al.* 2016). Out of which NTFPs contribution is significant in providing adequate food, fuel, feed, health and fibre for growing populations. The importance of NTFPs in rural livelihoods in developing countries has become widely

acknowledged. In India, NTFPs contribute an income equivalent to US\$ 2.7 billion per year and absorb 55% of the total employment in the forestry sector. Moreover, 50% of forest revenues and 70% of forest-based export income come from such resources (Shiva and Verma, 2002; Chauhan *et al.*, 2008).

Importance of Non-Timber Forest Products (NTFPs) in NER

NTFPs provide green social security to billions of people in the form of food supplements, traditional medicines, fuel and fodder, low-cost building materials and source of employment and income generation. NTFPs are a part of household subsistence strategies, providing macronutrients, carbohydrates, fats and proteins, or other essential micronutrients such as various minerals. NTFPs are used for feeding livestock. The NTFPs such as grasses and leaves are collected by rural communities to feed or house livestock. NTFPs, including medicinal plants, remained as an important source or raw material for traditional systems of medicines like Ayurveda, Chinese, Unani, Siddha, Tibetan and others across the globe. NTFPs are associated with the socio-economic and cultural life of forest-dependent communities inhabiting in wide ecological and geo-climatic conditions in different concentrations throughout the country. The NTFPs also serve as a vital livelihood safety net in times of hardship. As per Government of India report, at least 35 million man-days of employment were generated in the NTFPs trading, which includes collection and processing of economically valuable NTFPs species (Pandey *et al.*, 2016).

As North East states comprises mostly hilly areas. The most local forest fringe people depend on forest products for sustaining their livelihood. Traditionally all types of forest products are sold in all the local market of North Eastern states.

Some local market where forest products are sold in Jampui, Twidu, Kanchanpur, Karbook (Tripura), Pasighat, Naharlagan, Ziro, Mebo, Tawang (Arunachal Pradesh), Aizawl, Champai (Mizoram), Dimapur, Kohima (Nagaland), Karbi Along, Tezpur, Jorhat, Dhemaji, Silapathar (Assam), Imphal, Moirang, Bishnupur (Manipur), Lalbazar (Gangtok), Pakyong (Sikkim), Shillong, Tura (Meghalaya) etc. The minor forest products are sold by local people who are a major source of their income generation. For sustaining the livelihood of the North East people, the importance of non-timber forest product is much more.

Non-Timber Forest Products (NTFPS) of North East

Bamboo and Cane:

Bamboo is called green gold, in North East India bamboos are grown in the maximum amount. Bamboo based products are counted for high demand in the market. Bamboo shoots found in evergreen, and deciduous forests in North East is considered one of the delicious and nutritious food. Besides, it is consumed as curry, but it is also used for making pickle in Arunachal Pradesh, Tripura, Mizoram, Assam. Bamboo based handicrafts made in Tripura is one of the traditions of the state. The artisans of North Eastern states are making different bamboo-based jewellery, furniture, baskets, decorative home items, shiny mats. Recently bamboo-based water bottle is one of the value-added product which falls under highly attractive items. The important economic bamboo species which are grown in North East are *Bambusa tulda*, *Bambusa balcooa*, *Dendrocalamus longispathus*, *Bambusa pallida*, *Schizostachyum dullooa*, *Bambusa polymorpha*, *Melocana baccifera*, *Dendrocalamus strictus*, *Dendrocalamus hamiltonii*, *Thyrsostachys oliveri* etc.

Canes widely found in Mizoram, Khasi hills of Meghalaya, Manipur, Assam and Tripura. Different household essential products are made from cane which influences the economic condition in the North East region. The leaves of *Calamus arborescens* are used for roof thatching, stem of *Calamus gracilis*, *Calamus latifolius* and *Calamus tenuis* are used for making handicrafts, furniture and various household items. The cane industries have a tremendous role in income generation and producing quality products.

NTFPs as Vegetables:

The forest-based vegetables are contributing major food and nutritional security to the region. In every state of North East, the forest-based vegetables are commonly sold in the market apart from agriculture produced vegetable. Under forest-based vegetable Yongchak (*Parkiarox burghii*) is one of the vegetable tree crop mostly grown in North East. The pods of the tree are used widely for making traditional food in Manipur, Mizoram and Tripura. The plantation of this tree species leads to produce significant income generation to the growers.

Besides pod of Sajna (*Moringa oleifera*) are widely consumed as a vegetable in North east. The fruits of *Solanum indicum*, leaves of *Eryngium foetidum*, bulbs of *Allium hookeri*

are sold in local markets of North Eastern region. The fern *Diplazium esculentum* is one of the popular green vegetable which is mostly available in forest region. The leaves and barks of *Cinnamomum tamala*, *Cinnamomum cassia* are very commonly used as spice and condiments. The rhizomes of *Curcuma angustifolia*, *Curcuma zedoaria* and the capsules of *Amomum subulatum* are also used for many traditional foods of North East. The leaves of climber *Paederia foetida* are also common green leafy vegetable with medicinal properties. The inflorescence of *Musa paradisiacal*, leaves and fruits of *Piper hamiltonii*, *Piper pedicellatum* are also consumed as vegetable in Arunachal Pradesh, Meghalaya. Presently agroforestry system has been followed for cultivating vegetables in interspacing of forest tree species like teak plantation, sal plantation. Tuber of *Dioscorea* sp. also consumed some parts of Assam as NTFP vegetable.

Fruit Yielding NTFPs:

Various fruit trees are grown in a forest where fruits are collected and consumed. Among fruit trees Jamun (*Syzygium cumini*), Aonla (*Embllica officinalis*), *Terminalia cattapa*, *Terminalia bellirica*, *Anacardium occidentale*, *Eleocarpus floribundas*, *Tamarindus indica*, *Spondias pinnata*, *Aegle mermelos*, *Artocarpus heterophyllus*, *Dillenia indica*, *Baccaurea ramiflora*, *Zyzyphus mauritiana* etc. are grown widely in the forest of North East. The different species of Citrus are grown in forests are also collected. Assam lemon (*Citrus aurantifolia*) is a common fruit tree in the north east. Apart from horticultural fruit trees, the forest-based fruit trees which are grown as intercrop in forest land has also paved the way for generating income during fruiting season.

The rich biodiversity of the region makes a suitable condition for the birds to disperse the seeds of fruit trees to the different location of forests. Through Joint forest management committee, nursery fruit plants are also provided to the local people for the planting of economic fruit trees. During bearing season, the fruits are also eaten by the wildlife, birds which are maintained forest ecosystem.

NTFPs of Medicinal and Aromatic Value:

In the North East region of India, there are so many communities are residing. For all the states of North East, every community is practising ethnobotany based traditional medicine system. Several medicinal plants are collected from forests of the region. Due to high

biodiversity and fewer destruction forests, medicinal plants are grown naturally in this region. Even still some hilly region, local peoples are preferred for curing the disease through ayurvedic.

Some of common medicinal plants are found in forests of North East are *Costus speciosus*, *Withania somnifera*, *Rauwolfia serpentine*, *Centella asiatica*, *Andrographis paniculata*, *Tinospora cordifolia*, *Asparagus racemosus*, *Cissus quadrangularis*, *Hyptis suaveolens*, *Azadirachta indica*, *Vitex negundo*, *Acorus calamus*, *Bacopa monnieri*, *Calotropis gigantean*, *Chlorophytum tuberosum*, *Datura stramonium*, *Curcuma longa* etc. which are used abundantly for curing of diseases.

Some aromatic crops are also grown luxuriously in the interspace of forests. Local people are also surviving by growing and selling of aromatic crops. Citronella grass (*Cymbopogon winterianus*) and Lemongrass (*Cymbopogon flexuosus*) are grown widely in Assam. The aromatic oil has great demand in perfume industry. Like wise Sugandhimantri (*Homalomena aromatica*) rhizome has high valued aromatic oil. In Manipur, Assam, Tripura local peoples are selling the rhizome of Sugandhimantri, which fetches high market price.

Miscellaneous Forest Products:

Broom grass (*Thysanolaena maxima*) is popular in the North East. It comes under one of the economical non-timber forest product. Cultivation of Cash crops like *Piper betle* and *Areca catechu* are commonly cultivated in Khasi hills of Meghalaya. The leaves *Phrynium capitatum* is high valued item commonly used in Khasi hills and in Mizoram, as packaging item. The leaves retain the freshness of food items for a longer period. The Agar (*Aquilaria malaccensis*) plant is grown widely in Assam and Tripura. The agarwood oil has high aromatic value—annatto (*Bixa orellana*) is grown well in the North-East part of India. Seeds yield an edible dye, which is used for colouring butter, ghee, cheese, chocolate, hair oil etc. Simul tree (*Bombax ceiba*) is also grown in Tripura, Assam, Arunachal Pradesh. The floss used as a pillow and the tender leaves used as fodder. The maximum number of different species of orchid is found in North East. The forest of the region is the natural habitat of orchid. In Sikkim, Arunachal Pradesh, Assam, Manipur the different species viz. *Vanda*, *Dendrobium*, *Oncidium*, *Paphiopedilum*, *Catteliya* are grown. Different types of Palm species are grown in North East. Fishtail palm (*Wadyetia bifurcate*), Fishtail palm (*Caryota urens*), Royal palm (*Roystonea regia*), *Livistonia chinensis* are very common. The leaves of

the palm are used for thatching purpose. The palms also have ornamental value. The subabul (*Leucaena leucocephala*) is also grown some parts of Assam, Arunachal Pradesh as a fodder crop. *Imperata cylindrical*, leaves and young shoots of *Mikania micrantha*, *Blumea lanceolaria*, *Bidens pilosa*, stem of *Musa balbisiana* are harvested for fodder in Mizoram. In Champai district of Mizoram leaves of *Acacia pennata* are used for masticators purpose. *Phyllanthus emblica*, *Garcinia lanceifolia*, *Callaria brachiate*, *Artocarpus lakoocha* and *Artocarpus heterophyllus* are the fruits harvested from the plantation site in Mizoram. The barks of *Litsea glutinosa* is widely used in preparing incense stick. Incense stick industry is also emerging as large scale in Tripura and Assam.

Conclusion

The north-East part of India is mostly covered by forest. The different forest fringe communities are directly or indirectly depends on forest-based products. Forests of North-eastern region include deciduous, evergreen, moist forest which makes a favourable condition for high biodiversity and natural regeneration of many forest tree species. Economic forest products are growing luxuriously with less destruction. Therefore it is also needed for more scientific collection and harvesting of non-timber forest products. By adopting “Van Dhan Yojana” various forest products are come out successfully from the North East. Recently bamboo made water bottle already draw the attention globally. Even bamboo made various Jewellery, Furniture, Baskets already have high demand in the global market. Apart from that different species of medicinal plants are also found in North East. It is also observed that the income source of the local people of every state of this region, NTFPs plays a vital role. In the months of April-September, the bamboo shoots are collected and make value-added pickle form. The bamboo poles are an integral part of house construction and fencing. The local vegetable is also shared major diet in forest fringe region. It also needed more improvement of livelihood of local people by using scientific techniques of the utilisation of non-timber forest products. Indeed the Research and Training are frequently carried out in Rain Forest Research Institute, Jorhat, Assam and Forest Research Centre for Livelihood Extension, Agartala, Tripura in this region for improving forest-based livelihood by developing improve Bamboo propagation technique, Bamboo nursery, Scientific Sugandhimantri (*Homalomen aaromatica*) cultivation, Cultivation of Broom grass (*Thysanolaena maxima*), Training on Bamboo handicrafts, Jewellery, Lac cultivation, Beekeeping etc.

The entire region of North East will be more progress for providing better livelihood by improving income status through green skill development in Non-Timber Forest Products.

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