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Non-Timber Forest Produce of North East India

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INTRODUCTION

The north-eastern India comprises of seven states viz., Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. The region tends to be seen as a distant outpost as it is linked to the remaining part of India by a 22 km wide corridor. Under developed transport and linguistic and cultural barriers are the principal reasons for relatively poor contact between the people of this region and other parts of country. In socio-economic development, the region has not kept pace with rest of the country and is considered as a latecomer to development. The region covers an area of 255 thousand km^2. About seventy per cent of the tract is mountainous with only thirty per cent comprising of valleys mainly of Brahmaputra and Imphal - Barak river systems. The total population of north east India was recorded 31.5 million in 1991. About seventy per cent of the population is concentrated in Assam and thirty per cent in the remaining six states. Assam and Tripura have the highest population density of about 250 persons per km^2, while Arunachal Pradesh has a population density of only 10 persons per km^2. Another noteworthy feature of the region is that the hills are mostly inhabited by tribal populations which are also rich in forest wealth, biodiversity, traditional knowledge systems, art and culture and the hill people have a very high affinity to the forests and land. In most hills the forest-people bonds have been reinforced by way of religious beliefs, and taboos often based on principles of conservation management (Tiwari et al., 1998). The economy of the region is basically agricultural, supplemented by a limited extent of horticulture, animal husbandry and crafts production. It has a large tertiary sector and underdeveloped primary and secondary sectors. The region is heavily dependent on the rest of the country for many basic needs. An important feature of land use in the hills is non-demarcation of the boundaries between agricultural and forest lands. Though the FSI (1997) report shows a rosy picture about the forests of north east India, however, a closer analysis of the data reveals that a large chunk of forests in the hill states of Manipur, Meghalaya, Mizoram and Nagaland belong to open category having canopy cover of 10-40%. An areal survey of the region also reveals that except in Protected Areas, some isolated patches of community and sacred forests and inaccessible places like cliffs, ravines, gorges etc. old growth trees have vanished and composition of forest communities is changing very rapidly.

More than one hundred notified tribes live in the region. These ethnic groups are very strongly attached to their customs and traditions and maintain traditional control over resources. The people living in the vicinity of forests are highly dependent on the forest resources particularly for their day to day requirements of food, fodder, shelter and medicines. For decades, the management of Non-Timber Forest Products (NTFPs) which include all biological materials other than timber extracted from natural forests for human use (De Beer and Mc Dermott, 1989), received only secondary or tertiary attention relative to timber management. Though generally described as minor forest products, NTFPs make a major contribution to the economy of this region. A large portion of revenue of most state forest departments comes from the trade of NTFPs. The local people collect, process and market a large number of NTFPs such as bamboo, rattan, bidi leaves, resins, gums, lac, oilseeds, essential oils, broom grass, fodder, green manures, thatching materials, medicinal herbs and tanning materials. Rural communities also draw upon forests for a number of food items such as honey, mushrooms, fruits, nuts, tubers, edible worms and insects and vegetables which are consumed locally. The NTFPs provide employment to unskilled and skilled labourers which is of crucial importance to the otherwise rather stagnant rural economy in the hills of the north-eastern India (Tiwari et al., 1997).

The region is endowed with diverse types of forests which range from tropical humid forests

to temperate savannahs and bamboo thickets. This, in conjunction with the diversity of ethnic groups who inhabit the region, makes this region one of the most interesting set-up for the study of man-forest interactions. Besides, the study of various facets of NTFP management by the traditional communities provide an insight into the dynamics of man-forest interrelations which is very vital for the planning and development of a strategy for conservation and management of forests of the region.

The forest departments of the region do have some information about the NTFPs of their respective states which is used mostly for the purpose of collection of royalty and for implementing afforestation schemes. However, these informations are generally scanty and often are not readily available to the researchers and other user agencies. The studies conducted by our group (Barik et al., 1996; Tiwari and Tripathi 1997a, b; Tiwari et al., 1997) and Tripathi (1984) and Haridasan et al. (1996) are area and NTFP specific. Apart from these and some one time survey works done by Rastogi et al. (1998), no detailed research has been conducted on diversity, distribution, collection, processing and marketing of NTFPs of this region. Keeping this in view, and in order to fill in this lacunae in our knowledge, we made an attempt to study and document the present status of NTFP management in the region.

METHODS

The data and information presented in this paper have been collected through interviews using structured and semi-structured questionnaires. Interviewee included officials of state forest departments and other related agencies, herbal practitioners, traditional chiefs, and other knowledgeable persons. Group discussions with the village elders, headmen, and women folk were also held for the purpose of verifying and confirming the data collected through questionnaires and interviews. Informations about uses of plants and their availability were collected by way of a forest walk along with the local inhabitants. Traditional village markets were surveyed to collect data on trade of the NTFPs. Published and unpublished literature were also consulted. The plant species were identified using the flora of Kanjilal et al. (1934-1940) and Haridasan and Rao (1985).

RESULTS

Role of NTFPs in the Economy of the Region

It was found that people depend on the forests for hunting, gathering and for cultivation of seasonal as well as perennial crops. The forests are the main source of livelihood. In north-eastern region timber attained its prime importance only after establishment of forest based industries and development of road and rail network during past five decades. Prior to that the NTFPs were the main forest products used by man. Over the years forests were depleted and area under forest shrunk, however dependence of people on forests remained very high. Today the timber have more importance to the traders with a very small benefit to the rural poor, which is only in the form of employment and wages. The non-timber forest products on the other hand benefit the people directly and most benefits emanating from the NTFPs accrue to the rural poor. Many NTFPs of north-eastern India have high demand outside the region. For example, broom grass, bay leaf, cinnamomum, bamboo, cane and lichens have a good market outside this region. Moreover, the NTFPs which are consumed locally, also find their way to the local and regional markets thus generating income and employment to a wide section of the society. Apart from economic values, the NTFPs possess non-market values as well. The NTFPs like wild fruits, nuts, tubers, small animals, vegetables, fish, worms etc. meet the daily food requirement of the village people. Many of these items have high calorific value. Abundance of such foods is probably the prime reason for near total absence of malnutrition among tribal populations of this region. The medicinal plants come handy in the field of healthcare. Almost every village has one or many persons who know the herbs that help in treatment of various ailments. Most rural inhabitants particularly in remote areas, almost fully depend on such herbal medicines as the modern health care facilities are not adequate. On the weekly markets these herbal practionairs put-up stalls where from local inhabitants can find herbal medicines for almost every ailment

disease. Moreover, NTFPs like bamboo, cane etc. are used for making huts/cottages, and other household items.

Diversity

In absence of any detailed survey of NTFPs of the region it is not possible to provide a comprehensive list of NTFPs. The NTFP richness generally correlates positively with the biodiversity richness and presence of traditional communities which abound the region. The diversity of NTFPs is so vast that it may need years of extensive survey before any reasonably complete list of NTFPs of north-eastern India could be prepared. This is understood from the fact that during one of our recent group discussions with the elders of village Mukroh (Meghalaya) we listed as many as 22 different varieties of edible mushrooms which are collected by the villagers from the forests of the village. Many NTFP species *viz.*, *Podophylum hexadrum*, *Coptis teeta*, *Aconitum* sp. *Berberis* sp. *Picrochiza korrora*, *Panax pseudogingseng and Aquilaria agalocha* have become threatened due to over exploitation. According to a conservation assessment and management plan workshop of WWF, 11 species of medicinal plants of north eastern India are critically endangered and 3 have become vulnerable. The reason for this is heavy exploitation of these species from wild by traders and manufacturers of herbal medicines. In Arunachal Pradesh alone 6 bamboo species are used for house construction, 60 wild species provide edible fruits or other plant parts and about 40 species are known to provide incense for use in worship. Some important NTFPs of the region and their uses are given in tables 1-4.

Conservation, Management and Status

The forests in this region can broadly be classified into two categories. The reserved forests, protected forests and protected areas are the state managed forests which constitute the classed category. Apart from it all other forests fall under the category of unclassed forests which are generally owned by the village communities, and hence conservation and management of these forests are traditional. The traditional forest management systems in this region have some in built conservation measures. For example the community forests are maintained by the village "Durbar" (as called in Meghalaya, and known by other names elsewhere in the region). The bonafide inhabitants of the village can collect NTFPs from the forest for their daily requirements only. Extraction of NTFPs for commercial purpose is strictly prohibited and is considered as an offence. Felling of trees and killing of animals for trade are prohibited and generally attracts fines and social sanctions of varying orders. Sale of leafy vegetables, fruits, tubers and such other perishable NTFPs in local markets is permitted. This is mainly for equity reasons as most families engaged in such small trades belong to poorer section of the society. The NTFPs of greater economic importance, *e.g.* broom grass, bamboo, cane etc. can be extracted with prior permission from the authority. The extraction of the non-commercial NTFPs appeared to be sustainable while that of the ones extracted for commercial exploitation was non-sustainable as they were exploited in a haphazard way, and their stock in nature was found to be depleted within a short span of time.

Case studies in Mukroh (Meghalaya), and New Chungtia (Nagaland) villages revealed that the villagers maintain two types of forests; one is open for collection of fuelwood, small timber etc., the other is kept protected and only NTFPs *viz.*, mushrooms, leafy vegetables, fruits, nuts, medicinal plants, tubers, edible insects, worms, small animals like frogs, rodants etc. are allowed to be extracted. It is the protected patch of forest which yields maximum NTFPs.

Lately, due to private initiative certain firms have come up in different parts of the region who produce orchids and medicinal plants. Moreover there are many nurseries particularly near big towns and cities who specialise in the large scale production of ornamental plants like orchids and aeroids which were earlier collected from dense forests and sold to tourists and urban rich. Nagaon unit of Hindustan Paper Mills have also initiated an ambitious plan of raising bamboo plantation in shifting cultivation areas of Karbi Anglong district of Assam. Between 1995-98 they have covered 470 ha land under plantation of *Bamboosa tulda* and *Dendrocalamus hamiltonii*. This is a healthy trend which needs to be encouraged.

Table 1: List of food, vegetable, fruit and tuber species collected by the local villagers from the forests of north-eastern India

S. No.	Name of NTFP	Scientific Name	Parts used	Use	Availability State
1	Bamboo	*Melocana bambusoides* *Bamboosa tulda* *Dandrocalamus hamiltonii* *Bamboosa velutina*	Shoot, stem, seedling	Vegetable	All States
2	Tree bean	*Parkia roxburghii* *Litsea citrata*	Seeds/pods Seeds/pods	Vegetable	Hills
3	Bay leaf	*Cinnamomum tamala*	leaves	Spice	All States
4	Tulsi (Hi)	*Ocimum sanctum*	Leaves	Medicine	All States
5	Thekra (Be)	*Garcinia* sp.	Fruits	Food	All States
6	Colocasia	*Colocasia* sp.	Tuber	Vegetable	Tripura
7	Wild ginger	*Zimgiber, sp.*	Tuber	Vegetable	All States
8	Wild potatoes	*Tapioca, Diascoria* spp.	Tuber	Vegetable	All States
9	Lichen	*Usnea* sp.	Whole plant	Spice	Manipur
10	Wild Karela (Hi)	*Momordica lochinchinensis*	Fruits	Vegetable	All States
11	Ou-tenga (As)	*Dillenia indica*	Fruits	Vegetable	Assam, Arunachal Pradesh
12	Dalchini (Hi)	*Cinnamomum zeylanicum*	Bark	Spice	
13	Cardamom (Large ilaichi)	*Elettaria cardamomum*	Fruits	Spice	Arunachal Pradesh Manipur
14	Wild Banana	*Musa* spp.	Fruits and Stem	Food	All States
15	Cashew	*Anacardium oxidentale* sp.	Nuts	Food	Meghalaya
16	Lissi (As)	*Illicium griffithii*	Fruits	Spice	Arunachal Pradesh
17	Gamari (As)	*Gmelina arborea*	Flowers	Vegetable	Hills
18	Papra (As)	*Podophyllum hexandrum*	Fruits	Food	
19	Jungle Fruits/ Berries	*Myrica esculenta, Dorsinia indica*, Rosaceae members, *Solanum* spp.	Fruits	Food	All States
20	Jalphaii (As)	*Elaeocarpus floribundus*	Fruits	Food	Assam
21	Butter tree	*Madhuka butyraceoides*	Seeds	Food	Arunachal Pradesh
22	Mushroom/Tit kher	*Tricholoma imbricatum*	Fruiting body	Vegetable	Hills
23	Mushroom/Tit Tyndong (Kh)	*Gomphus floccosus*	Fruiting body	Vegetable	Hills
24	Mushroom/Tit Snier (Kh)	*Inocyba cutifracta*	Fruiting body	Vegetable	Hills
25	Mushroom/Tit Stem (Kh)	*Cantherellus cibarius*	Fruiting body	Vegetable	Hills
26	Mushroom/Tit Sohpailen (Kh)	*Tricholoma terrum*	Fruiting body	Vegetable	Hills
27	Mushroom/Tit Dud (Kh)	*Lactarius sp.*	Fruiting body	Vegetable	Hills
28	Mushroom/Tit Thnaw syiar (Kh)	*Ramaria formosa*	Fruiting body	Vegetable	Hills
29	Mushroom/Tit Labong hati (Kh)	*Romaria holorubella*	Fruiting body	Vegetable	Hills
30	Mushroom/Tit Sohpaitemlieh (Kh)	*Lentinus* sp.	Fruiting body	Vegetable	Hills
31	Mushroom/Tit Bun (Kh)	*Boletus edulis*	Fruiting body	Vegetable	Hills
32	Mushroom/Tit Snier Masi (Kh)	*Collybia allegretti*	Fruiting body	Vegetable	Hills
33	Mushroom	*Entoloma euthelum*	Fruiting body	Vegetable	Hills
34	Mushroom/Tit Tah (Kh)	*Suillus granulatus*	Fruiting body	Vegetable	Hills
35	Mushroom/Tit Ball (Kh)	*Scleroderma verucossum*	Fruiting body	Vegetable	Hills
36	Mushroom	*Boletus* sp.	Fruiting body	Vegetable	Hills

As : Assamese, Be : Bengali, Kh : Khasi, Hi : Hindi, Mi : Mizo

Table 2: List of medicinal plants and brewing herbs collected by local villagers from the forests of north-eastern India

S. No.	Name of NTFP/Item	Scientific Names	Parts used	Disease/Ailment	Availability State
1	Boch (As)	*Acorus calanis*	Rhizome	Dyspepsia colic, pain, remittent fever, Bronchitis, asthma and dysentery	Hills
2	Kandi (As)	*Abutilon indicum*	Roots, leavs, bark, seeds	Antihelminthic,laxative aphrodisiac, gonorrhoea, inflammation of bladder piles bronchitis and diarrhoea, toothache, leprosy	Hills
3	Ulatkaal (As)	*Ambroma augusta*	Roots	Nasal caterlt, tonsillitis, sore throat, gastric disorders, fever of inflammatory origin; sedative for relieving, pain and rheumatism	Hills
4	Atis root	*Aconitum hethophyllum*	Roots, whole plant	As tonic, hysteria, throat infection, dyspepsia and vomiting, abdominal pain and diabetes	Hills
5	Vasak (As)	*Adhatoda zeylanica*	Leaves	Bronchitis and cough diarrhoea, dysentery, tumour and uterine tonic.	Hills
6	Ghrit kumari (As)	*Aloe barbadense*	Leaves	Cuts and burns, and dermatitis.	Hills
7	Kulanjan (As)	*Alpinia galanga*	Rhizome	Rheumatism, bronchial catarrh, stimulant and carminative.	Hills
8	Chirritateeta kalmegh (As)	*Andrographis paniculata*	Leaves, roots, whole plant	Antihelmintic fever, jaundice, liver tonic, blood purifier, diabetes, and stomach ailments.	Hills
9	Satamul (Hi)	*Asperagus racemosus*	Tuberous roots	Coolant and demulcent and fever.	Hills
10	Neem (Hi)	*Azadiachta indica*	Leaves, barks, seeds, twigs.	Skin diseases, fever, and insecticide	All States
11	Indian Berberis	*Berberis aristatus*	Roots, stem	Bitter tonic for intermittent fever, eye lotion, source of alkaloid berberis.	All States
12	Karanja (As)	*Cesalpinia crista*	Leaves, nuts, bark	As tonic, emmenagogue and antihelmintic.	All States
13	Lissi (As)	*Illicium griffithii*	Fruits	Carminative, improves appetite.	
14	Mishmiteeta (As)	*Coptis teeta*	Roots/ Rhizome	Tonic and used for debility, dysentery, diarrhoea, and fever.	All States
15	Keu (As)	*Lostus speciosus*	Rhizomes	As an astringent, purgative, Antihelminthic. Source of diosgenin, and diabetes.	Hills
16	Dioscoria	*Dioscorea floribunda*	Tubers	Steroidal alkaloid Diosgenin used by pharmaceutical industry	Hills
17	Yathu (As)	*Fritillacaria cirrhosa*	Tubers	Tuberculosis, asthma, and bronchitis.	Hills
18	Yew	*Taxus wallichiana, T. baccata Cephalotaxus*	Leaf bark	As a source Taxol, anticancer	Hills
19	Panch harth (As)	*Gymnadaenia orchidis*	Tubers	Adaptogen improves general health, diarrhoea, dysentery, fever and abdominal swelling.	Hills
20	Gamari (As)	*Gmelina arborea*	Roots, flowers, fruits	cooling diuretic, astringent, fever, and urinary discharge.	Hills
21	Thekra (Be)	*Garcinia pedunculata*	Fruits	Diarrhoea	Hills
22	Chal mugra (As)	*Gynocardia odorata*	Seed oil	Skin diseases and leprosy.	Hills
23	Dhudhi (As)	*Holarrhaena pubescens*	Bark, fruits, seeds	Diarrhoea, dysentery and piles	Hills
24		*Hypericum* sp.	Whole plant	Anti HIV and cancer activity	Hills
25	Tulsi (Hi)	*Ocimum sanctum*	Leaves, roots, seeds	Stimulant, expectorant, bronchitis, ringworm, skin, diseases and fever	All States

Table 2: Contd....

S. No.	Name of NTFP/Item	Scientific Names	Parts used	Disease/Ailment	Availability State
26	Dron	*Leucas* sp.	Whole plant, leaves	Skin diseases and fever	Hills
27	Bhrt ghita (As)	*Oroxylum indicum*	Bark, roots, fruits	Purgative, rheumatism, leucoderma, diarrhoea and tonic	Hills
28	Ginseng	*Panax pseudoginseng, P.bipinnatifida, P. sikkimensis*	Rhizomes	Adaptogen, depression, fatigue, and for mental alertness.	Hills
29	Bhui amla (As)	*Phyllanthus fraternus*	Whole plant, roots, leaves	Jaundice, urinogenital infections, ulcers, swellings and sores.	Hills
30	Amla (As)	*Phyllanthus emblica*	Fruits	Source of Vitamin C, vomiting, urinary problems, leprosy, constipation, anaemia, fever and cold.	Hills
31	Papra (As)	*Podophyllum hexandrum*	Rhizomes	Purgative, vermifuge and cancer.	Hills
32	Sarpagandha (Hi)	*Rauvolfia serpentina*	Roots	Blood pressure anxiety, mental troubles, sedative, tranquilliser, and uterine contraction.	Hills
33	Sarpagandha (Hi)	*Rauvolfia tetraphylla*	Roots, bark, leaves, fruits	Adulterant to Rouvolfia Serpentina	Hills
34	Manjista (Hi)	*Rubia cordifolia*	Roots and old stems	Tonic, astringent, antidysentric, antiseptic, ulcers, skin rashes, and inflammation.	Hills
35	Bonbaigan (As)	*Solanum khasianum*	Fruits	Steroidal and source of alkaloid Solasodine	Hills
36	Chiraita (As)	*Swertia* spp	Whole plant	Tonic and febrifuge	Hills
37	Bohera (As)	*Terminalia bellirica*	Fruits, bark	Liver diseases, bronchitis, asthma, heart problems, diabetes, dropsy, diarrhoea, tonic, laxative, and antipyretic.	Hills
38	Hilika (As)	*Terminalia chebula*	Fruits, bark	Tonic, astringent, laxative, carmanative, expectorant, leucoderma, piles, anaemia.	Hills
39	Taggar (As)	*Valerina wallichii*	Rhizomes and roots	Hysteria, nervous unrest, emotional troubles, sedative and tranquillisers.	All States
40	Aswagandha (Hi)	*Withania somnifera*	Roots, leaves	Aphrodisiac, vitality, hiccup, dropsy, rheumatism, febrifuge, lesions and painful swellings	All States
41	Sadabahar (Hi)	*Vinca rosea*	Leaves	Anticancer	All States
42	Arjun (As)	*Terminalia arjuna*	Bark	Blood pressure and Heart ailments	All States
43	Bhedei lota (As)	*Hedyotis scardens Paedaria foetida*	Leaves	Stomach ailments.	Arunachal Pradesh, Assam
44	Masundari (As)	*Houtunya cordata*	Leaves	Stomach ailments.	All States
45	Hollarrhena	*Hollarrhena antidysentrica*	Bark	Dysentery	All States
46	Poppy Aphim (Hi)	*Papaver somniferum* sp.	Seeds	Sedative	Nagaland

Government agencies are also taking initiative in this direction for example, North Eastern Council, Shillong has provided a grant of rupees seven lakh to a herbal medicine practitioner to raise a medicinal plant garden in Smit (Meghalaya), some 20 kms away from Shillong.

The recent increase in the gap between demand and supply has encouraged several forest departments to raise plantations of rattan. Several such plantations are coming up in North Cachar Hills of Assam and parts of Arunachal Pradesh. In many places people have started protecting naturally grown trees in forests for collection of NTFPs. Bay leaves (*Cinnamomum tamala*) and Tree bean (*Parkia roxburghii*) trees are being protected in the forests of Meghalaya and Manipur respectively. Some communities like War-Khasis living in the southern slopes of Meghalaya bordering Bangladesh have

Table 3: List of NTFPs used by local villagers of north-eastern India as building materials, for handicrafts and other commercial items

S. No.	Name of NTFP/ Items	Scientific Names	Parts used	Use	Availability State
1	Charcoal	*Pinus* spp. *Quercus* spp. *Alnus spp. Schima wallichii*	Trunk, branches	Charcoal	Meghalaya, Arunachal Pradesh
2	Resin	*Pinus sp.*	Trunk	Resin	Meghalaya
3	Cane	*Calamus floribundus Calamus tenuis*	Stem	Making furniture, building material	All States
4	Bamboo	More than 10 species	Stem	Building material, furniture	All States
5	Teak	*Tectona grandis*	Leaves	For making plates	Meghalaya, Assam, Tripura
6	Broom grass	*Thysanolaena maxima*	Inflorescence leaves, stem	Broom,Fodder, thatching	All States
7	Narang (As)	*Smilax macrophylla*	Leaves	For shading of crop seedlings	All States
8	Tung (Mi)	*Aleurites fordii*	Fruits	Oil	Mizoram
9	Tung (Mi)	*Aleurites montana*	Fruits	Oil	Mizoram
10	Bask (Be)	*Trewia nudiflora*	Latex	Gum preparation	Tripura
11	Bidi (Hi)	*Diospyros melanoxylon*	Leaves	Making bidi	Assam
12	Sun grass	*Imperrata sp.*	Whole plant	Roofing and thatching material	All States
13	Perti porta or murta (As)	*Clinogyne dichotoma*	Leaves	Floor mats	All States
14	Safeda (Hi)	*Eucalyptus citriodora*	Leaves	Oil	Arunachal Pradesh
15	Citronella	*Citronella sp.*	Leaves	Oil	Assam
16	Bamboo	*Melocanna bambusoides, Dendrocalamus hamiltonii*	Stem	Paper mill, incense sticks, Handicrafts	Assam
17	Agar (As)	*Aquilaria agallocha*	Agar wood	Oil for perfumery	Arunachal Pradesh Assam
18	Rudraksha (As)	*Eleocarpus* spp.	Fruits	Religious use	Assam, Arunachal Pradesh
19	Reetha (As)	*Sapindus nul curossis*	Fruits	Detergent	Arunachal Pradesh
20	Wild banana	*Musa* spp.	Stem, leaves	Thatch, Rope	Arunachal Pradesh
21	Orchids	*Cymbidium* sp, *Dendrobium*, sp, *Paphiopedelum*	Inflorescence	Ornamental decorative	Hills
22	Avenue trees	*Mesua ferrea*	Flowers	Ornamental	Meghalaya
23	Ferns	*Adiantum* sp.	Leaves	Ornamental	Meghalaya, Arunachal Pradesh
24	Christmas plant	*Daphne shillong*	Fruits	Ornamental	Meghalaya, Arunachal Pradesh

developed a unique NTFP and forest management method where they cultivate economically important species *viz.*, black pepper (*Piper nigrum*), betel leaves (*Piper betle*), oranges, betel nut and a variety of fruits and vegetables in the forests without cutting any tree. Social Forestry Circle of Meghalaya Forest Department has promoted cultivation of broom grass in afforestation plots. Economic return from this project generated so much interest that many farmers raised broom grass in their shifting cultivation lands and home gardens. Management of NTFPs under joint forest management is a new concept in the region. Except in Melaghar (Tripura) no where else such management has become successful. From the above observations it emerges that NTFPs are generally being managed in traditional ways and cultivation/protection has

Table 4: List of NTFPs of animal origin collected by the local villagers of north-eastern India

S. No.	Name of NTFP/Item	Parts used	Use	Availability State
1	Wasp	Larvae	Food	Hills
2	Hornet nest	Comb	Food	Hills
3	Borer larvae	Larvae	Food	Hills
4	Frogs	Flesh, limbs	Food	Hills
5	Snails	Flesh	Food	Hills
6	Birds	Flesh	Food	All States
7	Squirrel	Flesh	Food	Hills
8	Bay bamboo rat	Flesh	Food	Nagaland and Arunachal Pradesh
9	Fish	Flesh	Food	All States
10	Snakes	Flesh	Food	Hills
11	Honey Bee Comb	Comb	Food and medicine	All states
12	Insects	Nymphs	Food	Mizoram, Nagaland
13	Red ants	Eggs	Food	All States

emerged only in cases of those NTFPs which have some commercial values. In several villages it was observed that as soon as commercial exploitation of a particular NTFP started, the species vanishes from the forests. It has happened in case *of Cinnamomum zylenicum* in Thad (Ri-Bhoi district) and in case of *Litsea marsinrum* and *L. salicifolia* in Netri (South Garo Hills district) villages of Meghalaya.

Collection and Harvest

Based on purpose and end-use the collection of NTFPs can be broadly discussed under two heads - *viz.*, non-commercial and commercial. NTFPs collected for non-commercial use are generally meant for household use. They include nuts, fruits, birds, animals, insects, vegetables, fish, fuelwood etc. People collect these NTFPs to meet their day-to-day food requirements. There are some other NTFPs that are occasionally collected for personal consumption *e.g.* bamboo, broom grass, thatch grass etc. The people involved in these types of collection are generally children, herders and women folk. From general observation it can be seen that the children are involved in collecting nuts, fruits, birds and sometimes vegetables, and fuelwood for household consumption. The herders collect wild animals, insects, worms, vegetables, fish etc. generally meant for use as evening meal. The women folk generally collect tubers, leafy vegetables, fuelwood etc. There are some other NTFPs *e.g.* medicinal plants which are collected by both the common villagers and traditional herbal practitioners. They are collected for both domestic and commercial purposes. It should be noted that the traditional use of many herbal medicines although popular in the region, has not yet gained acceptance and popularity outside. So, the scope of exploiting them commercially is still limited.

The NTFPs collected for commercial use depicts a different picture. In many cases it is seasonal and the mode of collection vary from place to place and time to time. The principal items that are collected for commercial use are, fuelwood, bamboo, cane, broom grass, ginger, spices, etc. Out of these items, broom grass is a seasonal NTFP and hence generates seasonal income and employment during the winters. Such seasonal collection of NTFPs involve villagers from all age and gender groups *e.g.* children, women and men. On the other hand, only men are found to be involved in the commercial collection of bamboo, cane and fuelwood meant for sale. There are other NTFPs like sal and teak leaves which are collected by the children and womenfolk and used for making plates.

In yet another mode of collection, the authorities i.e. the forest departments or the district councils auction forest areas for particular type of NTFPs which are known as 'Mahal'. These Mahals are sold to the contractors at a lump-sum price which generally is much lower than the market value of that quantity of NTFP. These contractors almost always over exploit the NTFPs. Most contractors have tremendous money, muscle and political power and thus capable of avoiding rules that regulate the collection, and marketing of the NTFPs. This is disadvantageous for sustainability of NTFPs as well as interests of the poorer section of the society.

'Mahal' system tends to generate monopoly which yields lower return.

A noteworthy feature of commercial exploitation of NTFPs collection is that most of the collection methods of medicinal plants, bamboo, cane and spices etc. are not sustainable, and the collectors are not concerned about their continued supply either. This type of collection of the NTFPs has resulted in decline in their stock as well as availability. For example. *Taxas baccata* and *Panax pseudoginseng* has become very rare in the forests of Meghalaya. On the other hand the non-commercial collection of the NTFPs is generally sustainable and does not pose any threat to the biodiversity of the region.

Processing

The north eastern states still lag behind in NTFP processing facilities. The processing techniques and the facilities in this region are mostly inadequate and traditional. Only for a few NTFPs there exists modern processing units. The modern processing/consumer units worth mentioning here are the paper mills that exist in Assam. They use bamboo and soft wood as raw materials. For other important NTFPs most of the facilities are private and traditional. As far as medicinal plants are concerned, there exists some traditional herbal practitioners who collect and process the herbs on their own. One of such renowned practitioner is Mr. Dhaniram Khanikar of Golaghat, Assam. He has a garden of medicinal plants plus a processing unit also which is famous all across north-east. Apart from the traditional herbal practitioners, there exist some private ayurvedic drug manufacturing firms who process the medicinal plants and produce the medicines. Some of these firms are famous across the nation for their product quality and performance *e.g.* Assam Drug Co. of Guwahati.

Bidi leaf, which is abundant in this region has some processing facilities in Assam. As for sal and teak leaves, they are traditionally processed in the villages. Especially the women folk and children are involved in processing/making of leaf plates. Broom grass is also traditionally processed, mainly by the traders/contractors of the region. Agar oil (*Aquilaria agalocha*) is another precious NTFP of the region. Once, this precious NTFP used to fetch good amount of revenue to the state forest departments of this region. But due to excessive exploitation this has become a rare NTFP and Government of India has banned export of this NTFP. Presently, trade of this NTFP is controlled by smugglers and unscrupulous traders. In Hojai area of Nagaon district of Assam, there are some cottage industries who still produce agar oil which has a very good market in Middle East.

There are some government agencies e.g. Khadi and Village Industries Board (KVIB) and North East Khadi and Industries Development Board (NEKIDB) who promote village and cottage industries in the region and many of them use NTFPs as raw materials. There are a number of bamboo ply and pulp making industries operating successfully in the state of Assam, Manipur and Mizoram. Except a few govt. agencies who take interest in processing of bamboo, cane, broom grass, honey etc., the governments of this region have not taken any interest nor initiative in processing and marketing of other NTFPs available in this region inspite of their having tremendous possibilities.

Pricing

As most NTFPs are gathered from the forests, the price is generally determined by the time spent in collection and not by the actual value of the NTFP. The collector and the communities owning the NTFPs have very little or no say in this regard. The collector is paid a price equivalent to his/her labour. For example if he/she spends one day in collection of certain quantity of NTFP, the price of that quantity of NTFP at that place will be equal to one day's wage. During this study it was noted that the women of Mukroh village (Meghalaya) engaged in collection of a *Usnea* sp. used as spice and in production of certain phytochemical sell it at the rate of Rs. 20 a kg, the quantity on an average one woman collects in a day. The retail price of this item varies between Rs. 100-200 a kg.

Marketing

The markets for the NTFPs can broadly be divided into two categories *viz.*, the organised market and the unorganised market. The NTFPs collected from forests are sold either in the raw form or in one or the other form of finished/semi

finished products in local village market or/and in the nearest urban market. It may be noted here that the value of the products, in the local village market differs significantly from the markets outside. For example, the price of raw broomgrass in the local markets in the interiors of Garo Hills, Meghalaya in 1995-96 was Rs. 1.50 to Rs. 2.50/- per kg. The same raw broomgrass was sold for Rs. 15 to Rs 20/kg at Dudhnoi (Assam), a town located on National Highway No – 37 bordering the Garo Hills of Meghalaya. A noteworthy feature is that at the same time broomgrass was being sold at Rs.12 to15 per Kg in the Khasi Hills.The reason was that the exploiters or the traders were organised and few in number in the Garo Hills and hence they monopolised the business there. On the other hand in the Khasi Hills the traders were not organised and the business was not monopolised plus there were some initiatiative from NABARD in this direction. Similarly, there are many other NTFPs whose value multiplies as they move to the outside markets (Tiwari and Tripathi, 1997a,b).

The important NTFPs of the region having good market value are broom grass, cane, bamboo, medicinal plants, fuelwood, mushroom, ginger, bay leaf, lichens and spices. In absence of any government support/regulation a number of valuable NTFPs such as bamboos, canes are being over exploited from both classed and unclassed forests of the region. Extraction of these NTFPs are mostly done by a few traders/ brokers who organise the extraction through the local villagers on wage basis. Thus most benefits accrue to the traders and very little benefit goes to the local villagers and the state exchequer. Hence, a major chunk of NTFP market is dominated by the traders who operate in an unorganised manner. A village survey in Pynursla community development block of Meghalaya revealed that in absence of organised marketing, the price of broom grass has slumped from Rs. 1700 a quintal in 1996 to Rs. 700 a quintal this year causing immense misery to the growers and gatherers of this NTFP. In the existing value chain system (Porter, 1985) of the NTFPs, the participation of the local producer/ collector is limited only to collection and disposal to the intermediary forces who control a major part of value addition process. A suitable intervention in the value chain system is needed for increasing the share of the benefits accruing to the rural people.

CONCLUSION

The importance of NTFPs in the life of the people of north east is immense. The availability, diversity and quantity of NTFPs is determined by the type and status of forests and the local pratices of exploitation. People depend on the NTFPs for a variety of needs which range from gathering of edibles for meals to a well organised extraction for industries and exports. However, the management is generally traditional and unsustainable causing depletion of the NTFP stock and poor economic return to the communities. General lack of facilities for processing, value addition, storage and marketing of NTFPs entails huge loss of the produce. Increasing pressure of population is another cause of growing concern. Urgent external intervention in these areas is required so as to ensure sustainability of this vital resource of the region and speedier economic development of the tribal communities through judicious use and sustainable management of these resources. This necessitates formulation of a long term strategy and planning for promoting cultivation of selected NTFPs through people industry linkages, involvement of various departments for conserving the NTFP species in their natural habitats and rehabilitating the endangered and already depleted NTFP species population.

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KEY WORDS Non-Timber Forest Produce. North East India.

ABSTRACT This paper analyses the status of diversity,

conservation and management, collection and harvest, processing, pricing and marketing of non-timber forest produce (NTFP) of north east India. The study reveals that the region is extremely rich in NTFPs, rural people are heavily dependent on the NTFPs for their subsistence, livelihood, the management practices are traditional, the collection and harvest methods are not sustainable, processing and value addition facilities are generally non existent and a large share of benefits accrue to the traders and middle-men who are mostly outsiders. The study suggests that immediate financial, managerial and technological interventions are required for ensuring sustainability of the NTFPs of the region.

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