



XV WORLD FORESTRY CONGRESS

Building a Green, Healthy and Resilient Future with Forests

2–6 May 2022 | Coex, Seoul, Republic of Korea

NTFPs as a Source of Livelihood and Climate Change Mitigation & Adaptation: A Case Study from Jharkhand, India

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Abstract

There is an inextricable link between forest resources and livelihood of rural people. The rural people including tribals – Oraon, Munda, Ho, Savar, Santhal, Birhor, Bhumij etc. living around forest area use these non-timber forest produce (NTFP) as their primary source of income, food, nutrition, and medicine. NTFPs may be used for subsistence or for sale, providing cash income and function as an economic buffer in times of hardships. The paper summarizes activities of livelihood based on NTFPs in Jharkhand. They get employment in activities related to NTFPs like plucking of Tendu leaves (*Diospyros* spp.), rearing of Silk- (*Antheraea mylitta* Drury) and cultivation of Lac- (*Kerria lacca* Kerr), making of fancy items from bamboo and cottage industry based on bamboo. Of these NTFPs, Lac and Silk occupy an important place in rural economy. Lac, which is a natural resin secreted by an insect, *Kerria lacca* (Kerr.), cultivated on host trees like Palas [*Butea monosperma* (Lam.) Taub] and Kusum [*Schleichera oleosa* (Lour.) Oken]. In Jharkhand mostly Tassar Silk is reared which is produced by a wild silkworm of *Antheraea mylitta* Drury which feeds primarily on host trees like Asan [*Terminalia tomentosa* (DC) Wt. & Arn]. The paper depicts activities of crafts based on bamboo, embroidery on silk cloth and manufacture of decorative items of Lac and other facets of these NTFPs and their contribution in improving earnings of rural people. The paper also critically examines how NTFPs can be effective tool in climate change mitigation and adaptation especially in REDD+. Hence NTFPs are of importance for food security, livelihood option, poverty eradication and for their role in climate change mitigation and adaptation. Government policy in India and Jharkhand related to Joint Forest Management, enactment of Forest Right Act 2006, and implementing Forest Working plan Code 2014 by, has brought about radical changes in approach towards management of NTFPs.

Keywords: Adaptation, Climate Change, Livelihood, NTFP

Introduction

Non-timber Forest Products (NTFPs) are important components of forest ecosystem having vast potential to address poverty issues for the marginalized, forest dependent communities, by facilitating livelihood options, including food security, income, health and sustainable human

development. People living around forests depend on NTFPs as their primary source of income, food, nutrition, and medicine. The tribal inhabitants from these area collect different non- timber forest products based on their ethnobotanical knowledge acquired from their ancient culture and ethnic practices .These ethnic knowledge or folklore evolved on the basis of necessities and resources available. But with the acculturation of society, the ethnic knowledge has been vanishing in some areas. Though during past few decades such knowledge has been documented, many such facts still need attention. Some excellent publication on ethnobotanical aspect of Jharkhand (or Erstwhile Bihar) appeared during last few decades are Bodding1925, Das1996, Goel1997, Gupta 1974, Haines1925, Hembrom 1991, Jain 91, Jain and Tarafder 1970, Kumar Sanjeev ,2014 ,2015 ,Pal and Srivastava 1976, Sriwastawa and Varma 1981, 1987.

The uses of NTFPs vary from place to place depending upon heterogeneity of the culture and traditions of the local communities. These products may be used for subsistence or for sale, providing cash income especially functioning as an economic buffer in times of hardships. Non-timber forest products are also integrated components of the forestry sector and have been gaining recognition as potential resources for promoting sustainable livelihoods, conservation and capacitating development agencies. NTFPs can be defined as forest produces other than major forest produce. Major forest produce are timber and fuel wood. Hence NTFP includes edible products grasses, mats, ropes and baskets, medicinal Plants, oil Seeds, tans and dyes, fodder, gums – resins, fibres and also includes products of insect origin like honey, lac and silk.

The present paper describes various NTFPs found in Jharkhand and their uses by the local people which are the very basis of adaptation.

Materials and methods

The study was conducted in Dhanbad, East Singhbhum, Simdega, Gumla, West Singhbhum, Ranchi, Khunti, Hazaribagh, Deoghar districts of Jharkhand. The data and information presented in this paper have been collected after discussion with local people and members of Village Forest Protection Committees. These have also been verified through consultation with other literature.

Forest Area in Jharkhand

Jharkhand, an eastern state of India, was carved out of the southern part of Bihar state on 15 November 2000. Jharkhand shares its border with the states of Bihar to the north, and Chhattisgarh to the west, Orissa to the south, and West Bengal to the east. It has an area of 79,714 km² Or 30,778 sq. mi (79,710 km²). The name "Jharkhand" means "The Land of Forests". Jharkhand accounts for 3.4% of the total forest cover of the country and ranks 10th among all states. The recorded forest area of the state is 23,605 sq. km which is 29.61 % of the geographical area of the state. As per Champion and Seth (1968) Classification for Forests, the state has five forest types viz. Moist Peninsular Low Level Sal-3C/C2e (ii), Dry Peninsular Sal-5B/C1c, Northern Dry Mixed Deciduous Forest-5B/C2, Dry Deciduous Scrub-5/DS1, Dry Bamboo Brakes- 5/E9. These belong to two major forest type groups viz. Tropical Moist Deciduous-Group -3 and Tropical Dry Deciduous Forests-Group -5. The Forest Types of India: Revisited (2013) by ICFRE, Dehradun has revised them as Moist Peninsular Sal-III/IIID, Dry Mixed Deciduous Forests-V/VC, Dry Sal Bearing Forests-V/VD and Dry

Grasslands- V/VE. The important sps. which constitute the forests are-Sal, Teak, Mahua, Asan, Dhaura, Gamhar, Kusum, Palas, Arjun, Chiraunji etc. The richness of flora of Jharkhand (erstwhile Bihar) was described by H. H. Haines in his book titled The Botany of Bihar and Orissa (Haines 1921-1925) and the book A Forest Flora of Chotanagpur (Haines 1908). Working Plans of Forest Divisions are also valuable sources of information about flora of that area.

Results and discussion

As a result of study various types of NTFPs and other forest produces have been recorded. These are used in various ways by the local people using their Traditional Knowledge (TK). Their documentation and inventarization have been done. Accordingly they have been grouped in –

1. Edible Products, 2. Grasses, 3. Mats, Ropes and Baskets, 4. Medicinal Plants, 5. Oil Seeds, 6. Tans and Dyes 7. Fodder Trees, 8. Gums and Resins 9. Fibres, 10. Animal Products, 11. Religious & Cultural Items, 12. Colours and Minerals.

These are described as below:

Edible Plants

Wild edible plants occupy an important place in the dietary of tribes of Jharkhand. Leaves, stems, inflorescence, roots, tubers or entire plants, depending upon the species, are consumed by these people. Collection and consumption of these plants depend upon the season of their maturity or period of flowering. Fruits, roots, bulbs of wild plants eg. *Alocasia macrorrhiza* (L.) Schott., *Amaranthus spinosus* L., *Anacardium occidentale* L., *Annona reticulata* L., *Artocarpus heterophyllus* Lamk., *Artocarpus lakoocha* Roxb., *Boerhavia diffusa* L., *Ficus bengalensis* L., *F. religiosa* L., *Ficus racemosa* L., *Buchanania lanzan* Spr., *Carissa carandas* L., *Dioscorea alata* L., *Dioscorea belophylla* Voigt., *D. pentaphylla* L., *Diospyros melanoxylon* Roxb., *Madhuca longifolia* (Koen.) Mac.Br., *Pueraria tuberosa*, *Schleichera oleosa* (Lour.) Oken, *Tamarindus indica* L. etc. are used.

Medicinal Plants

The use of folk medicines is attributed to their (people) decade long experience and faith in the herbal treatment. Among the plant parts, leaves, shoots, fruits, bark, flowers, rhizomes, roots, tubers, seeds and bulbs are commonly used. These are used as fresh plants as a whole, powder, extract, juice, paste or decoction and taken with water, milk, ghee, candy or honey. People use medicinal plants for the treatment of various ailments on the basis of traditional knowledge passed to them intergenerational. These are readily available and cheaper also. Some important species which are used as medicinal plants are- *Abelmoschus moschatus* L., *Abrus precatorius* L., *Acorus calamus* L., *Justicia adhatoda* L., *Allemanda cathartica* L., *Asparagus racemosus* Willd., *Bacopa monniera* (L.), *Bryonia palmata* L., *Catunaregam nutans* (DC) Tiruv., *Centella asiatica* (L.) Urban., *Curculigo orchioides* Gaertn., *Gloriosa superba* L., *Hemidesmus indicus* R.Br., *Litsea monopetala* (Roxb.) Pers., *Pueraria tuberosa* DC., *Rauwolfia serpentina* Benth. ex Kurtz., *Saraca asoca* (Roxb.) De Wilde, *Semecarpus anacardium* Linn.f., *Sphaeranthus indicus* L., *Sterculia urens* Roxb., *Terminalia balerica* Roxb., *Terminalia chebula* Retz., *Terminalia tomentosa* Bedd. etc.

Products from Insect Origin

The most important tangible benefits from insect's origin are- Lac Cultivation, Silk rearing and honey collection.

Lac Cultivation - Lac is a resinous protective secretion of tiny lac insect, *Kerria lacca* (Kerr.) which belongs to the family Tachardidae in the super family Coccoidea of the order Hemiptera. It is a biodegradable, non-toxic and odourless secretion. The tiny red-coloured larvae of lac insects settle on the young succulent shoots of the host plants and secrete a resinous fluid which covers their bodies. Some important host plants are - *Acacia auriculiformis* A.Cunn., *Butea monosperma* (Lam.) Taub., *Schleichera oleosa* (Lour.) Oken etc. The secretion from the insects forms a hard encrustation over the shoots which are harvested and scraped off. These are then dried and processed to yield the lac of commerce. This is a source of income to the rural people with a low investment. They have been doing this cultivation from time immemorial. The scrapped lac are then processed and used in production of Varnishes, Printing ink, Fireworks, Decorative items, Confectionery, Electrical appliances etc.

Silk Rearing (Sericulture) - Breeding of silkworms for the production of raw silk is termed sericulture. It is an important source of livelihood to the rural areas. The major districts of silk rearing are Ranchi, West Singhbhum, East Singhbhum, Dhanbad, Saraikela-Kharsawan and Gumla. Jharkhand generally produces Tassar silk. But in some pockets e.g. Gumla district, mulberry silk is also reared. Tassar Silk is produced by *Antheraea mylitta*. The main host plants are *Terminalia tomentosa*, *Terminalia arjuna*, *Shorea robusta*, *Lagerstroemia parviflora*.

Plants Used For Making Rope, Mats

During survey, it was found that these people use plant parts for making ropes and mats eg. *Agave americana* L., *Bauhinia vahlii* (Wt. & Arn.) Benth., *Butea monosperma* (Lam.) Taub., *Dendrocalamus strictus* (Roxb.) Nees, *Eriolaena hookeriana* W. & A. Bundan, *Eulaliopsis binata* (Retz.) Hubbard, *Ichnocarpus frutescens* (L) Br., *Lannea coromandelica* (Hout.) Merr., *Thespesia lampas* (Cav.) Dalz. & Gibs, *Tinospora cordifolia* (Willd.) Hook. f. & Thoms., *Typha domingensis* Pers. etc. These are then sold in market. They also use them for own purpose.

Plants Having Useful Oil Seeds

Forests are the main source of tree borne oil seeds. People use these oil seeds in various ways. These constitute not only essential ingredient of diet but are also used in various industries. They either consume it directly or sell in the market for further value addition. About 80% of oil bearing species have potential for commercial exploitation (Tiwari, 1994). *Abrus precatorius* L., *Azadirachta indica* A.Juss, *Bauhinia purpurea* L., *Buchanania lanzan* Spr., *Butea monosperma* (Lam.) Taub., *Celastrus paniculatus* Willd., *Litsea monopetala* (Roxb.) Pers., *Madhuca longifolia* (Koen) Mac Br., *Pongamia pinnata* (L) Pierre, *Schleichera oleosa* (Lour.) Oken, *Shorea robusta* Gaertn. f. etc. are some plants whose seeds are used for oil purpose.

Fodder Trees and Shrubs

Jharkhand often experiences dry spell of weather. Hence trees or plants from forests become an important source of nutrition for livestock. The young twigs, fruits and leaves are palatable for cattle. *Acacia nilotica* (L.)Del. ssp. *Indica* (Benth.)Bren., *Adina cordifolia*Hk.f., *Ailanthus excelsa* Roxb., *Alangium salvifolium* (L.) Wang., *Albizia lebbek* (L) Benth., *Artocarpus heterophyllus* Lamk., *Dalbergia sissoo* Roxb., *Madhuca longifolia* (Koen)Mac Br, *Pongamia pinnata* (L)Pierre etc. are used for the purpose of fodder.

Fuel wood

Species like *Acacia auriculiformis* A.Cunn, *Bauhinia purpurea* L., *Butea monosperma* (Lam.) Taub., *Mallotus philippensis* Muell.-Arg, *Pongamia pinnata* (L)Pierre, *Shorea robusta* Gaertn.f. etc. are used as fuel wood. The wood is used by the villagers in their houses and small hotels in the area. Fuel wood is also stored for the rainy season.

Climate Change and Adaptation

Climate change is a major issue for indigenous people around the world. It refers to a change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties, and that persists for an extended period. United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as: ‘a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.’

Realizing the need of an international effort to address issues of climate changes several conferences, negotiations and treaties have been held at international level and national level. At international level we have Earth Summit, Brundtland Commission Report, and Kyoto Protocol etc.

Forests play an important role in climate change. Mitigation and Adaptation are two options for addressing climate changes. As per IPCC LULUCF Report, we have three types of mitigation activities in the forestry sector- Afforestation, Reforestation and avoiding deforestation. Forests play a role in adaptation of communities dependent on forests by providing local ecosystem services. Climate change will increase the number of people who don't have enough to eat. Hence with the above discussion it is ample clear that NTFPs can help provide food security in both human and livestock diets by increasing the variety and season of foods and even in Hunger Period. NTFPs might represent a central part of the diet of communities living in and around forests. As a source of nutrition, NTFPS add value to forests, directly as a source of income from selling food or feed and indirectly as they represent an incentive to conserve forests and, thus, protect carbon stocks.

The people living around forest protect forests for NTFPs also for their sustenance. Therefore, they can be a direct tool for carbon sequestration. That is why the production of NTFPs can also indirectly help to store and sequester carbon in forest systems. Moreover, through income and livelihood generation, NTFPs directly contribute to reduce deforestation – which is necessary for REDD+.

Nature of dependence on NTFPS for Adaptation: The nature and degree of dependence of tribals on these NTFP depends on various factors like distribution and availability of forest produce, socio-economic condition and cultural trends. Such dependence can be described as:-

(1) Collection for consumption

Tribals collect non timber forest produce for their own consumption these can be grouped as:-

(a) Edible products, (b) Bamboo, (c) Oilseeds, (d) Medicinal Plants, (e) Fodder trees and (f) shrubs Leaves



Photographs: Fancy items made of Bamboo and Tender shoots of Bamboo and pieces made for making pickles and Curries

(2) Collection for income: Collection and consumption of NTFP by the local tribes depend upon their economic condition and type of the forest produce. They sell NTFP in local market to purchase their household goods like- salt, food, clothes etc. Barter system is also followed in some cases.

(3) Employment Generation: People living around forest suffer from many problems. Unemployment is one of them. NTFP is a very strong source of employment generation among tribals living around the forest. Basically two types of employment are there (i) **Self-employment.** ,removal of firewood from forest, rearing of lac insect, rearing of Tassar (silk),making of fancy items from bamboo, cottage industry based on bamboo. (ii) **Direct employment -** The various operations in forestry sector is a major source of direct employment. Plantation work renders employment opportunity to the people. Further collection of minor forest produce is also a major source of employment. The following table shows employment and payment for the collection of some MFP.



Collection of flowers of Madhuca longifolia



Collection of leaves from forest



Collection of firewood and leaves



Selling leaf plates in rural market



Scraping Lac from twigs of Palas (*Butea monosperma*)



Weaving of Silk Cloth



Plantation activities



Collection of Kendu Leaves (*Diospyros melanoxylon*)

FIGURES: Some Traditional livelihood Activities based on NTFP which can be used as measure of adaptation

Conclusion

Traditional forest-related knowledge and practices have continued to sustain the rich cultures and livelihoods of people living around forests. Uses of NTFPs not only conserves forest which conserve enhance carbon stock in forests but with multiple uses become a major way of climate change adaption to the people living in and around forest of Jharkhand.

Acknowledgements

The author is thankful to Divisional Forests Officers, members of Village Forest Management and Protection Committees for sharing valuable facts.

“The views expressed in this information product are those of the author and do not necessarily reflect the views or policies of FAO.”

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