THE VALUE OF NON-TIMBER FOREST PRODUCTS (NTFPs) IN PROMOTING INDIA'S RURAL LIVELIHOODS

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THE VALUE OF NON-TIMBER FOREST PRODUCTS (NTFPs) IN PROMOTING INDIA'S RURAL LIVELIHOODS. Non-timber forest products (NTFPs) are biological elements other than wood that are usually collected from forests for human and animal use and have both a consumptive and an exchange value. NTFPs provide a major contribution to the livelihood and health of the poor. The article aims to describe the present condition of NTFPs and marketing issues for NTFPs in India, as well as their importance in improving rural livelihoods. A systematic research review approach was used to get the desired results. The study retrieved approximately 238 articles from different databases and filtered 191, highlighting 51 articles related to the keywords, published between 1988 and 2022 were included in the analysis. During the investigation, forty-one numbers of NTFPs were identified and documented, and numerous potential NTFPs for enterprise growth have been identified according to the different zones of India. Rural people are using NTFPs for a wide range of uses, including food, fodder, fibre, traditional medicine, domestic items, agricultural equipment, and construction materials, and many of them are linked to cultures. Promotion and domestication of NTFPs, as well as suitable policy frameworks for harvesting and better processing techniques, are all required for increased food security, poverty reduction, and improved livelihoods. Site-specific and species-specific strategies may be created for the preservation, management, and exploitation of NTFP resources. NTFPs play a significant role in improving rural livelihoods in India, as well as providing a valuable source of employment for rural residents, though it has a complex marketing system.

Keywords: Non-Timber Forest Products, livelihood, rural, income, NTFPs Policy

NILAI HASIL HUTAN BUKAN KAYU (HHBK) DALAM MEMPROMOSIKAN PENGHIDUPAN PERDESAAN INDIA. Hasil hutan bukan kayu (HHBK) adalah unsur hayati selain kayu yang biasanya dikumpulkan dari hutan untuk dimanfaatkan oleh manusia dan hewan serta mempunyai nilai konsumsi dan nilai tukar. HHBK memberikan kontribusi besar terhadap penghidupan dan kesehatan masyarakat miskin. Artikel ini bertujuan untuk menggambarkan kondisi HHBK saat ini dan permasalahan pemasaran HHBK di India, serta pentingnya hal tersebut dalam meningkatkan penghidupan pedesaan. Pendekatan tinjauan penelitian sistematis digunakan untuk mendapatkan hasil yang diinginkan. Studi ini mengambil sekitar 238 artikel dari database yang berbeda dan menyaring 191, menyoroti 51 artikel yang terkait dengan kata kunci, diterbitkan antara tahun 1988 dan 2022 dimasukkan dalam analisis. Selama investigasi, empat puluh satu HHBK diidentifikasi dan didokumentasikan dan banyak HHBK yang potensial untuk pertumbuhan usaha telah diidentifikasi berdasarkan zona berbeda di India. Masyarakat pedesaan menggunakan HHBK untuk berbagai keperluan, termasuk makanan, pakan ternak, serat, obat-obatan tradisional, barang-barang rumah tangga, peralatan pertanian, dan bahan bangunan, dan banyak di antaranya terkait dengan budaya. Promosi dan domestikasi HHBK, serta kerangka kebijakan yang sesuai untuk pemanenan dan teknik pengolahan yang lebih baik, semuanya diperlukan untuk meningkatkan ketahanan pangan, pengentasan kemiskinan, dan peningkatan mata pencaharian. Strategi spesifik lokasi dan spesies dapat dibuat untuk pelestarian, pengelolaan, dan eksploitasi sumber daya HHBK. HHBK memainkan peran penting dalam meningkatkan penghidupan pedesaan di India, serta menyediakan sumber lapangan kerja yang berharga bagi penduduk pedesaan meskipun sistem pemasarannya rumit.

Kata kunci: Hasil Hutan Bukan Kayu, mata pencaharian, pedesaan, penghasilan, kebijakan HHBK

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I. INTRODUCTION

Non-timber forest products (NTFPs) are forest products other than timber (Pandey et al., 2016). Non-timber forest products have recently been recognized as valuable forest products, although only in rural areas (Ahenkan & Boon, 2010). These products have long been used as an important component of rural livelihood, and, importantly, NTFPs have been identified as essential forest products (Chandrasekharan, 1998). Exudates (gum, resins, and latex) to canes, fruits, flowers, seeds, seed derivatives, whole leaves, root or stem bark, fungi, microorganisms, and insects are among the forest products available for different consumable and non-consumable uses in the livelihood. According to Angelsen et al. (2014) and Shackleton & Pullanikkatil (2019) the use of NTFPs has been accepted to contribute to the well-being of the different rural and urban families and communities throughout the world in many ways.

NTFPs are essential for the functioning, security, and decrease of sustenance (Cocksedge, 2006; Cocks & Wiersum, 2003; Endamana et al., 2016). By their medicinal and dietary properties, NTFPs provide a significant contribution to impoverished people's health. It has a significant cultural value and importance for various ethnic communities across the world. In and within the forest areas and communities, the income shares from NTFPs range up to 50 percent (Angelsen et al., 2014; Vedeld et al., 2007). In recent years, there has been an increase in the demand for NTFPs. NTFPs offer nutrients, medications, fodder, timber, thatch, and building equipment, as well as mulch and non-farm earnings to rural households. NTFP goods also give significant nutrition not only to forest dwellers but also to the rural community (Wahyudi, 2017). On the basis of multiple uses, NTFP has been identified in over 3,000 species in India's forests and ecosystems (Tewari, 2013). According to Figure 2, there are different major NTFPs prominently found in the different states. In India, NTFPs generate $2.7billion yearly in cash and non-cash income and employ 55% of the forestry labor (Chauhan et al., 2008; Shiva & Verma, 2002).

In India, the rural regions contribute almost 70% of NTFP collections for sustainability (Mitchell et al., 2003). Rural inhabitants may satisfy their daily requirements and earn money quickly by collecting and selling NTFP commodities, but because there are so many routes for processors, consumers, traders, manufacturers, and exporters, the market channel has become complicated (Wahyudi, 2017; Yadav & Misra, 2012). According to (Mirjam &Tonen, 1999), there is a larger demand for NTFPs and a greater risk of overexploitation. NTFPs also have some entrepreneurial value according to the different parts of India. Given the importance of NTFPs in livelihoods, particularly in developing countries, it is surprising that the sector continues to receive so ittlee attention in budgets and in policies development, as well as in relevant government programs, forestry budgets, and forest-related products (Shackleton & Pandey, 2014).

According to Das and Prakash (2011), the NTFPs are crucial in ensuring the economic and nutritional security of rural and tribal residents, as well as in reducing malnutrition and ending poverty in these areas. In such situations, the commercial production and use of NTFPs can provide revenue for disadvantaged rural inhabitants and lessen their obligations in terms of money and daily living (Lahiri, 2016). Adequate conservation strategies and policies should be developed to offer both in-situ and ex-situ protection for these NTFPs as an additional safeguard against the loss of biodiversity (Lahiri et al., 2017).

The popularization of these NTFPs as a livelihood opportunity could be a vital intervention in this regard. Before taking a sincere attempt in that line, the situation arises a pertinent research question to answer: Does the existing economic condition of rural people from the NTFP have the potential for socioeconomic development through livelihood

generation activity? Therefore, the article aims to describe the current status, usages, economic contribution, and marketing practices of the NTFP. The article also explores the emerging issues and policies for improving the rural livelihoods of India.

II. MATERIAL AND METHOD

In terms of methodological approaches, relevant material on the current state of Non-Timber Forest Products (NTFPs) has been observed for investigating their significant roles in livelihood development and income creation. The relevant literature was collected from different journals, articles, books, reports, conference papers, and government websites. Only research publications relating to significance in livelihood were selected for the study. Theoretical papers containing key concepts were also included. Based on standards and subject-related keywords, a systematic review was done. A systematic research review approach (Petticrew & Roberts, 2008) was used by involving searching, compiling, selecting, and using critical viewpoints to get the desired results.

The research utilized pertinent online publications sourced from a variety of platforms, including Google Scholar, Science Direct, and Scopus website. The search criteria employed were characterized by a high degree of sensitivity, low specificity, and a focus solely on the subject matter. Our analysis was conducted through a singular level of coding based on emergent themes. Specifically, the search terms 'non-timber forest product fruit', 'wild edible fruit', and 'rural livelihood' were employed in English language searches on Scopus and Web of Science during the period of 2021-22. The articles were subsequently filtered to encompass subjects within the domains of agriculture, biology, economics, environmental science and studies, food science, forestry, plant science, social science, and urban studies. Consequently, articles pertaining to fields such as chemistry, engineering, genetics, immunology, medicine, microbiology, etc., were deliberately excluded.

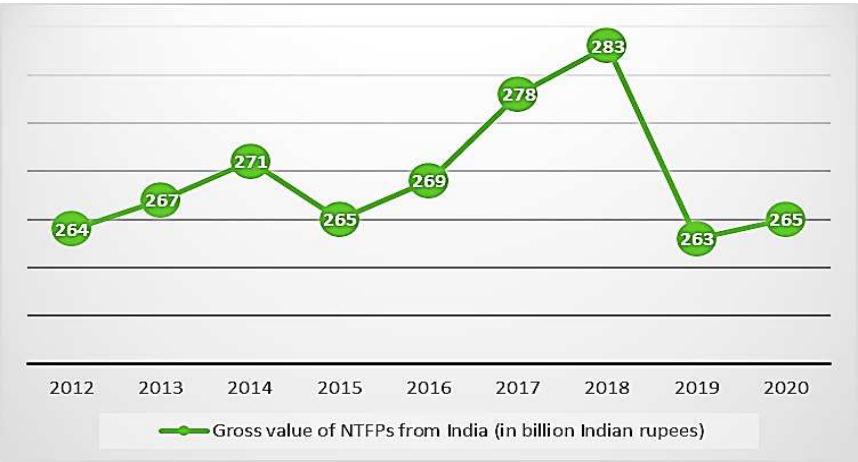
In aggregate, these searches produced a total of 238 distinct outcomes. These literary works underwent a screening process to assess their pertinence to the conservation, ecology, economics, and ethnobotany of wild edible fruits. At this juncture, articles delving into nutrient composition, historical and horticultural records, as well as pharmacology of wild fruits, contingent on their country locations or study areas (amounting to 191 articles), were omitted. Following this screening process, which took into account the country locations or study areas and their relevance to the specified keywords, only 51 out of the initial 238 articles were deemed suitable for inclusion in the analysis. The temporal boundaries of the study were set from 1988 to 2022. Additionally, the research incorporated insights gleaned from the authors' personal experiences with Non-Timber Forest Products (NTFP). Finally, data was collected, assessed, and subsequently presented in various tabular formats to facilitate illustration and discussion.

III. RESULT AND DISCUSSION

A. Status of NTFP in the Indian economy

The importance of NTFP in rural India and the forest economy is enormous. The forests and ecosystems of India include more than 3,000 plants that are known as NTFPs (Tewari, 2013). These plants provide the forest inhabitants with a sizable quantity of yearly revenue as well as job opportunities. Furthermore, such resources account for forest incomes and forest-based export revenue is 50 percent and 70 percent, respectively (Chauhan et al., 2008; Shiva & Verma, 2002).

According to Statista (2023), in the Indian economy's forest products sector in 2023, the gross value added of non-timber forest products was around 265 billion Indian rupees in the fiscal year 2020, which is higher than the previous fiscal year, and the range of forest



Source: Statista, 2023

Figure 1. Gross value of NTFPs from India (in billion Indian rupees)

products contributed over 13 percent to the gross value of non-timber forest products. According to studies conducted in India, NTFPs are important contributors to rural forest-dependent individuals, many of whom have few non-agricultural economic alternatives (Chandrasekharan, 1998; FAO, 1991). In India, the rural areas account for around 70 percent of NTFP collection for their sustainability (Mitchell et al., 2003). According to the research, NTFP-based small-scale companies offer up to 50 percent of income for 20 to 30 percent of the rural labor force. As a result, for forest dwellers, collecting NTFPs was a key source of money and employment. According to the findings, the central Indian zone, north Himalayan zone, western Indian zone, southern Indian zone, and north-eastern zone each has 10, 8, 9, 8, and 12 potential NTFPs that have been identified for enterprise development in India. The list of some potential NTFPs as developing enterprises according to the different zones of India is given in Table 1.

B. Types of NTFPs and Utilization in India

There are two types of NTFPs: consumable and non-consumable. Consumable NTFPs are used at the individual and household level and also function as marketable commodities, whereas non-consumable NTFPs are associated with the indirect benefit of effective forest management and encouraging ecotourism (Shrestha et al., 2020).

In ancient India, forest-dwelling tribals have lived on their inherited lands. NTFPs are necessary for their survival and maintenance of forest ecosystems. NTFP collections are very common for the tribal populations, and they have a high traditional value. These are readily available in the forest and provide a valuable source of monetary benefits for the tribal (Figure 2).

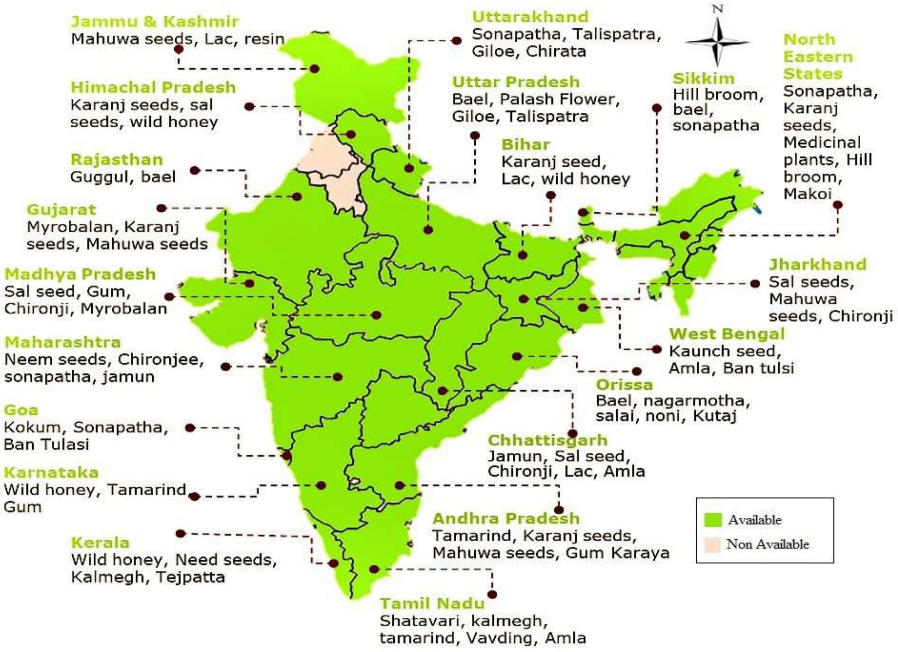
Table 2 (see Appendix 1) presents a comprehensive overview of various potential Non-Timber Forest Products (NTFPs) along with their respective uses and collection periods. In the course of this research, a total of forty-one NTFPs were identified and documented. These resources have served diverse human needs since ancient times (Panayotou & Ashton, 1992; Sonowal, 2007), encompassing functions such as sustenance, fiber, fodder, traditional medicine, agricultural tools, domestic materials, construction resources, and cultural significance (Chopra, 1993). Wild edible items stand out as rich sources of essential nutrients like vitamins, protein, carbohydrates, fats, and minerals. Depending on their availability, these products can be consumed throughout the year

Table 1. List of NTFPs having potential for enterprise development in India

Sl. No.	Central Indian Zone	North Himalayan zone	Western Indian Zone	Southern Indian Zone	North-Eastern Zone
1.	Tendu leaf *(Diospyros melanoxylon)*	Bay (*Laurus nobilis)*	Tendu leaf (*Diospyros melanoxylon)*	Cinnamon bark (*Cinnamomum zeylanicum)*	Broom grass (*Thysanolyna maxima)*
2.	Sal leaves (*Shorea robust*)	Jatamansi *(Nardostachys jatamansi)*	Bael (*Aeglemarmelos)*	Mahagli/ swallow root (*Decalepsis spp.)*	Bamboo (*Bambusa spp.)*
3.	Chironji (*Buchanania lanzan)*	Tulsi (*Ocimum* spp.*)*	Chronji (*Buchanania lanzan*)	Karanj (*Millettia pinnata)*	Phrynium (*Phrynium pubinerve)*
4.	Lac (*Kerria lacca)*	Lichen (Jhula) (*Parmelia perlata)*	*Salai/Salaiguggul (Boswellia serrata)*	Tamarind (*Tamarindus indica)*	Bay (*Laurus nobilis)*
5.	Tamarind (*Tamarindus indica)*	Kutki (*Picrorhiza kurrooa)*	Guggal gum (*Commiphora wighti)*	*Kachanar (Bauhinia spp.)*	Orchid (*Dendrobium spp.)*
6.	Sabai grass (*Eulaliopsis binata)*	Chirata (*Swertia chirata)*	Bahera (*Terminalia bellirica)*	Sandal (*Santalum album)*	Agar (*Acqularia spp.)*
7.	Kalmegh (*Andrographis paniculata)*	Reetha (*Sapindus mukorossi)*	Harra (*Terminalia chebula)*	Kokam (*Garcinia indica)*	Ashoka (*Saracaasoca)*
8.	Mahua (*Madhuca latifolia)*	Pine (*Pinu* ssp.*)*	Chrota/ Wild Senna (*Cassia tora)*	Satawar (*Asparagus racemosus)*	Cinchona (*Cinchona officinalis)*
9.	Sal seeds (*Shorea robust*)	-	*Mahua (madhuca Latifolia)*	-	Chirata (*Swertiachirata)*
10.	Anola (*Emblica officinal)*	-	-	-	Soft Bolly gum (*Litsea glutinosa)*
11.	-	-	-	-	Kalmegh (*Andrographis paniculata)*
12.	-	-	-	-	Cane (*Calamus spp.)*

Source: Planning Commission, 2011

(Sundriyal & Sundriyal, 2001). Additionally, aside from villagers residing at the forest periphery, other rural communities engage in the collection of NTFPs for economic gain through market sales (Sarmah et al., 2008). For traditional forest dwellers, NTFPs are crucial for their sustenance, shelter, and healthcare needs, thereby exerting a substantial influence on the enhancement of rural economies. These products are indispensable for fulfilling daily dietary requisites (Vedeld et al., 2007). In order to meet their day-to-day necessities, individuals gather an assortment of resources such as fruits, leaves, fibers, gums, dyes, honey, wax, and so forth. Notably, there are certain non-timber forest products that remain available year-round, significantly impacting the livelihoods of rural communities.



Source: Ministry of Tribal Affairs, Government of India (2020)

Figure 2. State-wise availability of NTFPs

C. Contribution of NTFPs to Income Generation

In India, NTFPs are linked to the socioeconomic and cultural lives of forest-dependent people living in a variety of ecological and geo-climatic settings across the nation (Pandey & Bisaria, 1998). NTFPs serve significant purposes in the economics of the households of rural communities that live near or in the forest. NTFPs first assist household's subsistence and consumption requirements for energy, nourishment, medical, and building, among other things. Second, they are viewed as a safety net during times of recession, e.g., income losses from specific sources of output, such as crop failure), and third, certain NTFPs provide daily cash flow (Angelsen& Wunder, 2003). Timber production, or land conversion to pastureland or farming, may not be as important as NTFPs in terms of usage and monetary value. Local and wide-scale commercialization of NTFPs is also on the rise in several locations, giving cash income to a rising number of people (Cunningham, 2011; Welford & Breton, 2008).

In India, NTFPs provide 10 to 70% of total income and 25 to 50% of food requirements, and over 50 million people rely on them for both cash income and survival (Hegde et al., 1996). NTFPs account for almost 50% of India's forest revenue and 70% of its forest-based export income (Singh et al., 2020).NTFPs provide greater opportunities to the rural tribal people. According to a study conducted by Peerzada et al. in 2022, in the Himalayan region of India, Non-Timber Forest Products (NTFPs) accounted for 53.33% of household income. This was followed by income from labor (15.27%), goat/sheep husbandry (11.46%), dairy (9.85%), and agricultural crops (6.80%). Other sources of income included arts and crafts (1.49%), horticulture (1.46%), and services (0.34%). The research also revealed a noteworthy correlation between the socioeconomic status of families and their reliance on NTFPs for livelihood (Peerzada et al., 2022).

The majority of NTFP-related operations, such as collecting, plucking, processing, transport, and marketing, are labor-intensive and offer job opportunities. In India, 20 to 30% of the rural labour population receives up to 50% of their income from NTFPs-based small-scale enterprises, although the forestry industry as a whole account for 55% of all employment (Singh et al., 2020). A favorable investment environment can help a rural individual find work, which decreases the high flow of migration of rural youth to urban areas and other countries for income generation and employment. This will also help to alleviate poverty by offering chances for local income generation.

According to a report by the Government of India, the NTFPs trade, which includes the gathering and processing of commercially important NTFP species, created at least 35 million man-days of employment (Pandey et al., 2016). NTFPs play a significant role in the livelihoods of forest-dependent rural people, and they have very little non-agricultural income share. Collection and marketing of NTFP commodities might generate immediate revenue, provide alternative jobs, and provide enough money to meet the daily needs of rural residents (Wahyudi, 2017).

D. NTFPs Opportunities in Rural Livelihoods

Many researchers have acknowledged the importance of non-timber forest products (NTFPs) in supporting rural community resilience and livelihood development in both developed and developing countries (Campbell &Luckert, 2012; Cavendish, 2000; Karki & Bhattarai, 2012; Mukul et al., 2010). A sustainable livelihood includes both tangible and intangible social activities and resources (DFID, 2020). Traditional and essentially, NTFPs are linked to the livelihoods of rural people, and they also have the ability to reduce seasonal and long-term malnutrition, as well as food insecurity. In India, local people have a deep understanding of the forest resources, which they employ for food security and agricultural productivity. Rural communities generate revenue from these sources, which gives an alternate source of income. NTFPs have played a significant role in Indian forest policy and cumulative development planning. With the rising concern for conservation, as well as rural poverty and sustainable development, academics, conservation and development groups have worked to bring NTFPs to the forefront of discussion in recent decades (Belcher et al., 2005; Subedi, 2006). Compared to other sustainable income-generating options, the collection and marketing of NTFPs is a feasible source of subsistence of livelihood, income, and safety net options throughout the Indian forest edge communities (Peerzada et al., 2022). As a result, numerous developing nations, including India, have been under pressure to create smooth marketing practices and policies that support NTFPs.

E. Marketing Issues for NTFPs

The NTFP market is very complicated due to the large number of stakeholders at the collector, trader, and processing levels. The market's complexity of NTFP is due to the absence of proper herb identification and final product categorization techniques, government control and market monitoring, and an appraisal of NTFPs, including medicinal plant inventories available in the forests (Sari, 2010). Thirteen marketing channel has been observed:.

C1: Collector →Village agent → Wholesaler →Consumer,
C2: Collector → Village agent → Wholesaler →Inter-state exporter / Outside trader,
C3: Collector → Village agent → Processor →Wholesaler →Retailer→ Consumer,
C4: Collector → Village agent → Processor →Retailer →Consumer,
C5: Collector → Village agent →Wholesaler →Retailer →Consumer,
C6: Collector → Wholesaler →Inter-state exporter / Outside trader,
C7: Collector → Wholesaler →Retailer

→Consumer,
C8: Collector → Wholesaler → Consumer,
C9: Collector → Processor →Wholesaler →Retailer →Consumer,
C10: Collector → Processor →Wholesaler → Inter-state exporter / Outside trader,
C11: Collector → Processor →Retailer →Consumer,
C12: Collector → Retailer →Consumer and
C13: Collector → Consumer

Local collectors of Non-Timber Forest Products (NTFPs) have two main options for their collections: either they consume a portion themselves, or they sell it to consumers, local processing units, traders within the community, and village agents. Market players at different tiers are motivated by the goal of maximizing profits in their collection and sale of these products (Yadav & Misra, 2012). However, the demand for NTFPs at the local level presents challenges due to the various forms in which they are traded, including raw, semi-processed, and fully processed, and the diverse channels through which they are distributed. At the manufacturing or processing level, there are several primary and intermediate processors involved. Initial processing may be carried out by collectors and cultivators, while intermediate processors acquire the herbs from collectors and local traders, process them further, and then distribute them to larger manufacturers or local markets. With numerous processors, consumers, traders, manufacturers, and exporters in the market, the channels for NTFPs have become intricate and multifaceted (Yadav & Misra, 2012).

F. Emerging Issues and Policy

NTFPs have garnered attention in international discussions due to their potential role in livelihood and poverty reduction, making it critical for governments to implement pro-poor reforms in the forest sector to safeguard and increase the livelihood advantages to rural communities. Despite the fact that NTFPs have been discussed in the policy agenda of significant international forums, treaties, and continuing global assessments, there is limited information on NTFP-specific policies at the international, national, or regional levels (Ahenkan& Boon, 2010).In India, NTFP meets the needs of rural and tribal communities for firewood, forage, minor forest produce, and small timber. Specific rights and concessions for special groups or communities such as tribals, scheduled castes, and other disadvantaged people living in and around forests are explicitly specified in the policy (Bhavan, 1988). In 2006, the Forestry Commission emphasized the necessity for

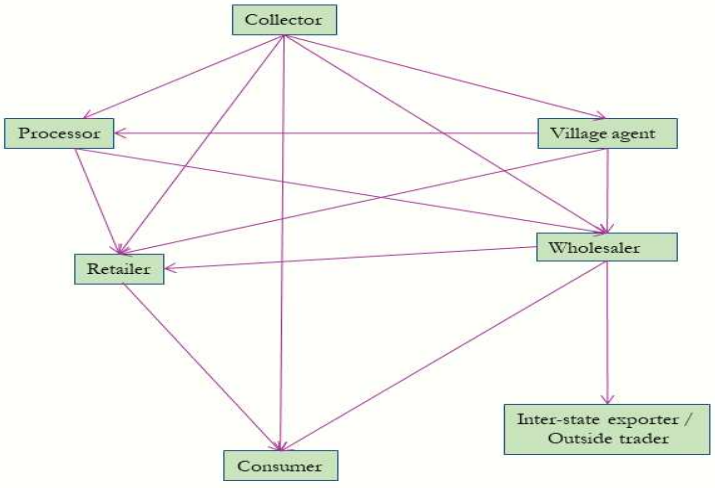


Figure 3. Marketing channels of NTFP

enhanced regulation of unsustainable biotic activities, specifically grazing, tendu leaf collection, sal seed harvesting, and fuel wood extraction. Additionally, there was a call for the promotion and commercialization of medicinal plants in the North-East region. This proposition holds significant promise in offering landowners in the area a viable alternative to the practice of Jhuming, or slash-and-burn cultivation.

However, the legislative frameworks of different state of countries are not clear or do not offer sufficient security of tenure for forest-dependent populations (Pandey et al., 2016). Certain prerequisites must be met before investing in locally controlled forestry. NTFP laws and policies may enhance ecological sustainability, trade equality, and better rural lives with more information, effective stakeholder engagements, and strategic policy-making processes. Policies and legislation should reflect the level to which NTFP resources, markets, and stakeholders are commercialized. Incentives and supporting legal frameworks, such as government assistance for the producer, trader, and processor market access and premium pricing through certification, tax breaks, and outreach and education on new policies and regulations, are key to the success of NTFP programs. A regulatory structure, including permits, quotas, tariffs, and trade restrictions, is also required, especially when there is rapid and significant commercial demand. Governments need to address NTFP legislation in ways that take into account the financial, conservational, and social costs and benefits of such measures, as well as government implementation capacity and compliance likelihood.

G. Discussion

A sustainable livelihood consists of the skills, resources (including both financial and social activities), and resources necessary for a means of subsistence (DFID, 2020). Traditionally and essentially, NTFPs are connected to the livelihoods of rural human beings. People have utilized non-timber forest items for an assortment of purposes since forever ago, for food, feed, fibre, customary medication, home-grown materials, horticultural executes, and development materials, and a significant number of them are related to societies (Chopra, 1993). NTFPs mainly help families' resource and utilization necessities for energy, sustenance, clinical, and working, in addition to other things as they are seen as a security net during seasons of the downturn and certain NTFPs also give daily income. For 20 to 30 percent of the rural labor population, NTFP-based small-scale businesses provide up to 50 percent of their revenue by which, NTFP collection was a major source of income and employment for forest inhabitants (Joshi, 2003).

The study highlights that rural livelihood and sustenance are mostly dependent on particular NTFP species. Some of the consumable and non-consumable non-timber forest products (NTFPs) species are enrolled and recognized as their source of income. During the present investigation, forty-one NTFPs were identified and documented. It includes different seeds, plate-making leaves, tans and dyes, gum and resin, culinary goods, oil-producing bamboo, fiber, thatching, broom-making plants, and medicinal plants. The NTFP market is very complicated due to the large number of stakeholders with different marketing functions. As this is a potential venture, smooth marketing regulation, policies, and laws for collection and marketing should reflect the commercialization of NTFP resources, markets, and stakeholders. Proper implementation of a minimum support price (MSP) scheme for the non-timber forest products will enhance the forest dwellers' income level and develop the value chain for NTFPs, which includes the creation of cold storage facilities, warehouses, processing units and modernization of markets(Singh et al., 2020). A regulatory framework is necessary, especially when commercial demand for NTFPs is high and growing. In terms of policy implication, governments must assess the financial, environmental, social, and political benefits and costs of NTFP law before passing

it because there is no national consensus, and the states' monopoly rights are uncertain (Pandey et al., 2016).

IV. CONCLUSION

NTFPs are abundant in India, and they play a significant role in improving rural income. NTFP businesses have the ability to help alleviate poverty and enhance livelihood opportunities. According to the findings of the study, several prospective NTFPs for enterprise growth have been found in various zones of India. A total of forty-one NTFPs were discovered and recorded throughout this research. It comprises seeds, plate-making leaves, tans and colors, gum and resin, culinary items, oil-producing bamboo, fibre, thatching, broom-making plants, and medicinal plants, among other things. Since the time immemorial, humans have used non-timber forest products for a variety of reasons. The ability to grow and commercialize NTFPs should be given to local communities for their empowerment and for obtaining profitable returns from NTFPs; communities should be equipped with information about the market, legislation, and goods. There are thirteen numbers of marketing channels that have been observed. The NTFPs' marketing channels are very complex as large numbers of stakeholders at the collection, trading, and processing levels. Food security, enterprise development, and improved livelihoods all need the promotion and domestication of NTFPs, as well as appropriate policy frameworks for harvesting and better processing techniques. For the protection, management, and exploitation of NTFP resources, site-specific and species-specific strategies and policies may be developed. Other than the forest department, some organizations such as the Department of Rural Development, AYUSH (Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy), industries and employment generation, tribal welfare, biodiversity, biotechnology may become imperative for the government to adopt an inclusive approach in NTFP management. These NTFP products are eco-friendly, easy to use, a remunerative piece of art for urban residents, and, most importantly, they may be a significant source of sustenance for rural economies. These NTFPs may be collected throughout the year, providing a reliable source of income for the tribals in this area while also providing opportunities for local entrepreneurs to thrive. NTFPs play a significant role in improving rural livelihood in India and provide an important source of employment for rural people.

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DECLARATION

We declare that this work is an original report of our research, has been written by us, and has not been submitted anywhere for publication. The work is almost entirely our own work; the collaborative contributions have been indicated clearly and acknowledged.

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Appendix 1. List of different potential NTFPs according to their uses and collection period

Table 2. List of different potential NTFPs according to their uses and collection period

Sl. No	Name	Scientific Name	NTFPs Use	Commercial use	Benefit for Health	Collection period
1.	Tendu	*Diospyros melanoxylon*	Fruits and leaves	The leaves are used for bidi and cigarette making. The wood is used for shoulder poles, mine props, buildings, and shafts of carriages.	Mental disorders, nervous failures, diarrhea, palpitations of the heart, stringent effect, urinary, skin and blood diseases	April-June
2.	Bay	*Laurus nobilis*	leaves	Spices	Treatment of Cholesterol, diabetes	May - June
3.	Cinnamon	*Cinnamomum zeylanicum*	Bark	Spices	Cholesterol, diabetes, bowel syndrome. or other stomach or intestinal problems.	May and November
4.	Broom grass	*Thysanolyna maxima*	sticks (stem)	Brooms fuel, fodder, mulch material	Mouthwash	July to February
5.	Sal	*Shorea robust*	Seed, gum, and leaves	The leaves are used for making plates, cups, and for wrapping	Treatment of dysentery, gonorrhea, boils, and toothaches.	May and June
6.	Jatamansi	*Nardostachys jatamansi*	Rhizome	Perfume	Antioxidant, antispasmodic, tonic, laxative and antiepileptic	September–October
7.	Bael	*Aeglemarmelos*	Leaves, roots, bark, fruit and seed	-	Improve digestive system and cure stomach disease	January - April
8.	Mahagli/ swallowroot	*Decalepsis spp.*	Root	Pickles and sharbat (Cold Drinks)	Ayurvedic medicines	Year-round
9.	Bamboo	*Bambusa spp.*	Tender shoots, leaves, Rhizomes, sticks (stem)	Roofing, walling, flooring, matting, basketry, cordage, cathodes, housing, agricultural implement, paper pulp, packaging material	Treating fever, fidgeting, and lung inflammation	Year-round
10.	Chironji	*Buchanania lanzan*	Nut	Essential oil	Boosts Immunity, Aids In Digestion, Treats Wounds And Ulcers, Enhances Cardiac Functioning, Enhances Skin Quality, Purifies Blood	April and May
11.	Basil / Tulsi	*Ocimum spp.*	leaves, roots, stem, flowers, seeds	Essential oil	Anxiety, stress, and fatigue, treat asthma, bronchitis, colds, and the flu.	Year-round
12.	Karanj	*Millettia pinnata*	Seeds	Essential oil	Treatment of Skin diseases	June-October
13.	Phrynium	*Phrynium pubinerve*	Leaves	Packing and wrapping of edible items	Anti–arthritic	Year-round

Sl. No	Name	Scientific Name	NTFPs Use	Commercial use	Benefit for Health	Collection period
14.	Lac	*Kerrialacca*	Lac	Polishing, sealing	Hepatoprotective and anti-obesity drug	Oct-January and April-July
15.	Lichen (Jhula)	*Parmelia perlata*	Whole plant	Perfumes, dyes and condiments	Treatment of skin diseases, cough, asthma, renal calculi, burning maturation and localized swelling	November and December
16.	*SalaiSalaiguggul*	*Boswellia serrata*	Gum	Textiles, cosmetics, confectionery, inks, pastes, cigar	Treatment of Collagenous arthritis, Crohn's disease, Menstrual cramps	January-April
17.	Tamarind	*Tamarindus indica*	Flower, fruit, root, bark, stem, seed and leaves	Carpentry, wheels, wooden utensils, sugar mills, agricultural equipment, mortars, boat planks, toys, panels, and furniture are all made from wood. Seed oil is used to size fabrics and may also be used to make paints and varnishes, as well as to light lights. The tannins in the bark can be utilized to make ink or to keep colors from bleeding.	Relieves sores, boils rashes, throat infection, cough, ulcers, fever, swelling, relief pain, intestinal worms, conjunctivitis, cure fevers, control, dysentery, gastric acid, treats scurvy and diarrhea	March to April
18.	Kutki	*Picrorhiza kurrooa*	Seed, roots, rhizomes, and shoots or aerial parts	-	Treat disorders of the liver and upper respiratory tract, reduce fevers and treat dyspepsia, chronic diarrhea, and scorpion sting	September and October
19.	Guggal gum	*Commiphora wightii*	Gum	-	High cholesterol, Osteoarthritis, Rheumatoid arthritis	April to May
20.	*Kachanar*	*Bauhinia spp.*	Root, gum, leaves, flower buds, and seeds	Tannins and Wood are used in making household and agricultural implements.	Amoebic dysentery, cuts and wounds, skin diseases, diarrhea, and other stomach disorders	May to June and September to October.
21.	Orchid	*Dendrobium spp.*	Bloom, Leaves, Roots	Used as herbal tea, drinks, ornamental flower	Strengthen the immune system, treat cancer, and improve eyesight	December to April
22.	Sabai	*Eulaliopsis binata*	Grass	Used for rope and papermaking	-	August-September
23.	Bahera	*Terminalia bellirica*	Nut	-	Treatment of Cough and Cold, Constipation,	November-February
24.	Sandal	*Santalum album*	Wood, nut, oil	Used to manufacture soaps, cosmetics, confectionary, etc.	Used as antiseptic, and for the treatment of headache, stomach-ache, urinary and genital disorders	Year-round

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Sl. No	Name	Scientific Name	NTFPs Use	Commercial use	Benefit for Health	Collection period
25.	Agar	*Acqularia spp.*	Leaves, bark, oil	Wood oil used in perfume	Used as a carminative, qi-regulating drug to relieve gastric problems, coughs, rheumatism, and high fever.	Year-round
26.	Kalmegh	*Andrographis paniculata*	Whole plants	-	Joint pain, headache, malaria, jaundice, febrifuge and body pain.	Year-round
27.	Chirata	*Swertia chirata*	Whole plants	Used in alcoholic and non-alcoholic beverages.	Used for constipation, fever, upset stomach, intestinal worms, loss of appetite, cancer, and skin diseases.	October–November
28.	Harra	*Terminalia chebula*	Bark, flower, and fruit	It is used to produce dyes and ink, as well as for building, furniture, carts, and tools.	Treatment of digestion, tonics, laxatives, stomachic, expectorants, haemostatics, mental complaints, and as alternatives treatment for intestinal worms, dysentery, irregular uterine hemorrhage and inflammation, involuntary ejaculation, coughs, and asthma.	May–June
29.	Kokam	*Garcinia indica*	Seed and fruit	-	Good digestive, source of antioxidants, relieves constipation, and boosts brain activity.	April-May
30.	Ashoka	*Saracaasoca*	Stem, bark, flowers, seeds	Used to prepare cosmetics	Help to improve skin complexion.	July to October
31.	Mahua	*Madhuca latifolia*	Flower, seed, and whole plant	Essential oil	Anti-bacterial, carpentry work, pain killer, wine/liquor, worship.	April-June (northern), Oct-Nov. (southern)
32.	Reetha	*Sapindus mukorossi*	Fruit	Used as a cleaner for hair, skin, and clothing.	Promotes skin health and heals snake bites.	November to December.
33.	Chrota / Wild Senna	*Cassia tora*	Roots, leaves, and seeds	Feed for livestock and birds	Used as an antiperiodic, laxative, anthelmintic, ophthalmic, cardiotonic, liver tonic, and expectorant	June-August
34.	Satawar	*Asparagus racemosus*	Whole plant	The squeezed root is used for washing clothes.	Piles, wound, fever, cough, weakness, anti-toxic, diarrhea, headache, asthma, urinary disorder.	April – May
35.	Cinchona	*Cinchona officinalis*	Bark	Used in alcoholic beverages and as a bitter flavoring in tonic water.	Treating bloating, fullness, and other stomach problems	Year-round

Sl. No	Name	Scientific Name	NTFPs Use	Commercial use	Benefit for Health	Collection period
36.	Anola	*Emblica officinal*	Fruit, Bark, root, stem and leaves	Commonly used to make jams, jellies, tarts, chutneys	Fruits are traditionally used as an expectorant, diuretic antipyretic, ant scorbutic, and commonly used to make jams, jellies, and tarts. The fruits are one of the components of "Triphala".	January-February
37.	Pine	*Pinu ssp.*	Resin, nut	Used in industries of paint, paper, varnish, soap, rubber, and waterproofing.	Used for upper and lower respiratory inflammation, hoarseness, stuffy nose, common cold, fevers, and blood pressure problems.	March to May and September to November
38.	Soft bollygum	*Litsea glutinosa*	Bark	Used as an adhesive paste	Treatment for fever, swelling, and diarrhea.	Year-round
39.	Canes	*Calamus spp.*	Leaves, stem and root	Used for basketry, jewellery, furniture, ropes, mats, bags, baskets, furniture, walking sticks, umbrella handles, sports goods and home decorative items.	The leaf extract is applied externally to cure pain and eczema and also to heal wounds.	Year-round
40.	Ber	*Ziziphus mauritian*	Bark, fruits, and leaves	The wood is used for furniture and agricultural implements, tool handles, cabinet work, golf clubs, sandals, harrows, household utensils, baseball bats, toys, and packaging.	Treatment of indigestion, diabetes, and urinary disorders.	February to April
41.	Neem	*Azadirachta indica*	Leaves and seed	Used for disease and pest control and cosmetics.	Treatment of heart problems, eczema, arthritis, malaria, anti-microbial, tooth washing, chicken pox, and blood purification.	Year-round

(Source: Chandel *et al*., 2018; Lepcha *et al*., 2019; NTFP *Centre of Excellence*, 2022; Shahabuddin & Prasad, 2004; Yadav &Dugaya, 2013)