

Diversity, Utilization and Socio-Economic Importance of Non-Timber Forest Products in Rural Communities of Bahraich District, Uttar Pradesh, India

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Abstract—Non-Timber Forest Products (NTFPs) are important forest resources supporting rural livelihoods in the Terai region of Uttar Pradesh. This study assesses the diversity, utilisation, socio-economic importance, marketing, and sustainability challenges of NTFPs in Bahraich district, with particular reference to communities around Katarniaghat Wildlife Sanctuary. An exploratory and descriptive approach was adopted using household surveys, interviews, focus group discussions, key-informant interviews, and secondary sources. The study identified diverse NTFPs, including edible fruits, honey, medicinal plants, bamboo, leaves, grasses, gums, resins, mushrooms, seeds, and fodder. These products contribute to supplementary household income, seasonal employment, food security, traditional healthcare, and livelihood diversification. However, inadequate storage and processing facilities, limited value addition, fluctuating prices, poor market access, dependence on intermediaries, and unsustainable harvesting practices constrain their livelihood potential. Strengthening community-based institutions, value addition, local processing, market linkages, sustainable harvesting, and institutional support can improve economic returns while reducing pressure on forest resources. The study concludes that sustainable NTFP management, integrated with community participation and biodiversity conservation, can strengthen rural livelihoods and contribute to sustainable development in Bahraich and the wider Terai region of Uttar Pradesh.

Index Terms—Non-Timber Forest Products, Rural Livelihoods, Bahraich, Katarniaghat Wildlife Sanctuary, Uttar Pradesh, Forest Economy, Sustainable Harvesting.

I. INTRODUCTION

Non-Timber Forest Products (NTFPs), also known as Minor Forest Produce (MFP), comprise a diverse

range of biological resources obtained from forests other than timber. These include medicinal plants, fruits, seeds, honey, bamboo, grasses, gums, resins, mushrooms, fodder, and fibres. NTFPs constitute an important component of rural livelihood systems by providing food, traditional medicines, employment opportunities, and supplementary income to forest-dependent communities. In India, these resources are particularly important for marginalised populations living in and around forest areas. It is estimated that nearly 100 million people derive part of their livelihoods from the collection, processing, and marketing of NTFPs, while these products contribute substantially to rural employment and forest-based income generation (FAO, 1995; TRIFED, 2023).

Uttar Pradesh contains important forest ecosystems, particularly in the Terai region along the Indo–Nepal border, where forest resources support a considerable diversity of economically useful NTFPs. Bahraich district, situated in the northeastern part of the state, contains extensive forest tracts associated with the Katarniaghat Wildlife Sanctuary, an important component of the Dudhwa Tiger Reserve landscape. The forests of Bahraich provide a range of NTFPs, including honey, bamboo, medicinal plants, wild fruits, grasses, fodder, and fuelwood, which contribute to the livelihood needs of forest-fringe communities (Singh & Gupta, 2017). Rural households, particularly marginal farmers, landless labourers, women, and economically weaker sections, depend on these resources for supplementary income and livelihood diversification, especially during agricultural lean periods (Shackleton et al., 2011).

The importance of NTFPs extends beyond household-level subsistence and income generation.

They contribute to local markets, small-scale enterprises, traditional healthcare systems, and value-added economic activities, while also having implications for biodiversity conservation and sustainable forest management (Belcher et al., 2005). However, the NTFP sector in Uttar Pradesh continues to face several challenges, including unsustainable harvesting practices, inadequate market infrastructure, limited opportunities for value addition, price fluctuations, and the dominance of intermediaries within the marketing chain (Pandey et al., 2016). These constraints may reduce the economic returns received by primary collectors and limit the broader livelihood potential of forest resources.

Recognizing the importance of NTFPs for rural development, the Government of India has introduced several initiatives, including the Minimum Support Price (MSP) Scheme for Minor Forest Produce and the establishment of Van Dhan Vikas Kendras through the Tribal Cooperative Marketing Development Federation of India (TRIFED). These initiatives aim to support fair pricing, promote value addition, and improve market access for forest-product collectors (TRIFED, 2023). In this context, systematic assessment of the role of NTFPs in the rural economy of Bahraich district is important for understanding their contribution to income generation, employment, livelihood security, and sustainable development.

The present study, therefore, explores the socio-economic significance of NTFPs in Bahraich district and examines their potential to strengthen rural livelihoods while promoting the sustainable utilisation of forest resources.

II. OBJECTIVES OF THE STUDY

The study focuses on understanding the role of Non-Timber Forest Products (NTFPs) in supporting the livelihoods and rural economy of Bahraich district, Uttar Pradesh, particularly among communities associated with the Katarniaghat landscape. The objectives are:

- a) To inventory and characterise the major NTFPs occurring in Bahraich district and document their availability, utilisation, and traditional importance.

- b) To examine the livelihood dependence of local communities on NTFPs and assess their contribution to household income, employment, food security, and subsistence needs.
- c) To investigate the NTFP supply and value chain, covering collection, processing, transportation, marketing, trade, and the involvement of different stakeholders.
- d) To assess the major constraints and sustainability concerns related to NTFP collection and utilisation, including resource pressure, market limitations, pricing, institutional support, and harvesting practices.
- e) To explore value-addition and livelihood opportunities and develop recommendations for sustainable NTFP management, community participation, conservation, and rural economic development.

III. STUDY AREA

Bahraich district is situated in northeastern Uttar Pradesh, along the Indo–Nepal international border, and forms an important part of the ecologically significant Terai region of the Upper Gangetic Plain. It lies between 27°04' and 28°24' N latitude and 81°03' and 82°04' E longitude, covering approximately 4,696 km². The district experiences a subtropical monsoonal climate, with hot summers, cool winters, and annual rainfall of about 1,000–1,500 mm, mainly received during the southwest monsoon. The region is characterised by fertile, moisture-retentive alluvial soils that support diverse vegetation and agriculture (District Gazetteer of Bahraich, 2011; Forest Survey of India, 2023; Singh & Singh, 2019).

The major rivers, including the Ghaghara, Girwa, Suheli, Kaudiyala, and Rapti, have created extensive wetlands, floodplains, grasslands, and moist forest habitats, contributing to the region's rich biodiversity (UP Forest Department, 2022).

The Katarniaghat Wildlife Sanctuary, covering approximately 400.6 km², represents a major forested landscape of the district and forms the northernmost component of the Dudhwa Tiger Reserve Landscape. Established in 1975 under the Wildlife (Protection) Act, 1972, it forms part of the Terai Arc Landscape and supports tropical moist deciduous and riverine forests, grasslands, swamps, and wetlands. The

sanctuary provides habitat for important species such as the Bengal tiger (*Panthera tigris*), Indian rhinoceros (*Rhinoceros unicornis*), swamp deer (*Rucervus duvaucelii*), gharial (*Gavialis gangeticus*), and Gangetic dolphin (*Platanista gangetica*) (Jhala et al., 2021; WWF-India, 2020).

The vegetation is predominantly represented by Sal (*Shorea robusta*) forests, associated with *Terminalia tomentosa*, *Terminalia bellirica*, *Syzygium cumini*, *Madhuca longifolia*, *Mallotus philippensis*, *Dillenia pentagyna*, *Adina cordifolia*, *Ficus* spp., and bamboo species such as *Dendrocalamus strictus* and *Bambusa bambos*. The understory supports diverse shrubs, climbers, grasses, and medicinal and aromatic plants that provide important Non-Timber Forest Products (NTFPs) (Champion & Seth, 1968; Singh et al., 2017).

The rural economy is largely agrarian; however, communities living near forests depend substantially on NTFPs such as honey, medicinal plants, bamboo, wild fruits, mushrooms, fodder, fuelwood, and other forest produce. These resources support household income, food security, traditional healthcare, livestock maintenance, and seasonal employment, particularly among marginal farmers, landless labourers, women, and economically disadvantaged households (Shackleton et al., 2011; TRIFED, 2023). Thus, the forests of Bahraich are important both for biodiversity conservation and for sustaining rural livelihoods.

IV. MATERIALS AND METHODS

4.1 Research Design

The present study was conducted using an exploratory and descriptive research design to investigate the role of Non-Timber Forest Products (NTFPs) in the rural economy of Bahraich district, Uttar Pradesh. The study combined qualitative and quantitative approaches to understand the patterns of NTFP collection, utilisation, marketing, and their contribution to household livelihoods. Exploratory research is particularly suitable for examining livelihood systems and forest-resource dependence in regions where comprehensive economic assessments are limited (Creswell & Creswell, 2018).

4.2 Data Collection

Both primary and secondary data sources were utilised to obtain comprehensive information on NTFP resources, livelihood dependence, marketing systems, and institutional arrangements.

4.3 Primary Data Collection

Primary data were collected during field surveys conducted in selected villages located within and around the forest fringes of Katarniaghat Wildlife Sanctuary and adjoining reserve forest areas. Data collection methods included:

1. Household Surveys: Structured questionnaires were administered to forest-dependent households to gather information regarding demographic characteristics, occupation, landholding status, NTFP collection practices, income sources, seasonal dependence, and utilisation patterns. Similar approaches have been widely adopted in livelihood studies involving forest-dependent communities (Angelsen *et al.*, 2014).
2. Semi-Structured Interviews: Individual interviews were conducted with NTFP collectors, village elders, traders, and local stakeholders to document traditional knowledge, harvesting practices, market linkages, and perceptions regarding resource availability and conservation.
3. Focus Group Discussions (FGDs): Group discussions were organised with community members, women's self-help groups, and NTFP collectors to understand collective experiences related to resource use, livelihood dependence, market challenges, and opportunities for value addition (Krueger & Casey, 2015).
4. Key Informant Interviews: Detailed interviews were conducted with Forest Department officials, representatives of local cooperatives, non-governmental organisations (NGOs), and village leaders to obtain information on forest management policies, conservation initiatives, and NTFP-related development programmes.

4.4 Secondary Data Collection

Secondary information was collected from various published and unpublished sources to supplement field observations and provide broader contextual understanding. Major sources included:

- Working plans and records of the Uttar Pradesh Forest Department.
- Management plans of Katarniaghat Wildlife Sanctuary.
- Reports and publications of the Tribal Cooperative Marketing Development Federation of India (TRIFED).
- Forest Survey of India (FSI) reports.
- Government publications, census records, and district statistical handbooks.
- Peer-reviewed research articles, books, theses, and scientific reports related to NTFPs, rural livelihoods, and forest resource management (FSI, 2023; TRIFED, 2023).

4.5 Sampling Design

A purposive sampling technique was adopted for the selection of study villages because NTFP collection activities are concentrated in villages located near forest boundaries. Villages situated within a radius of approximately 5–10 km from the Katarniaghat Wildlife Sanctuary and adjoining forest areas were selected for detailed investigation. Respondents were chosen to represent different stakeholder groups involved in the NTFP economy, including:

- NTFP collectors and gatherers
- Marginal and small farmers
- Village elders and traditional knowledge holders
- Women's self-help groups
- Local traders and intermediaries
- Forest Department personnel
- Community leaders and Panchayat representatives

This multi-stakeholder approach facilitated a comprehensive understanding of the socio-economic and ecological dimensions of NTFP utilisation (Shackleton *et al.*, 2011).

4.6 Data Analysis

The collected data were compiled, classified, and analysed using descriptive statistical techniques. Quantitative data were analysed using percentages, frequencies, means, and tabular presentations, whereas qualitative information obtained through interviews and focus group discussions was interpreted using thematic analysis.

The analysis focused on the following parameters:

1. NTFP Diversity and Availability: Identification and categorisation of major NTFPs collected from the forests of Bahraich district, including their seasonal occurrence and traditional uses.
2. Livelihood Contribution: Assessment of the contribution of NTFPs to household income, employment generation, food security, and livelihood diversification.
3. Market Structure and Value Chain Analysis: Examination of collection, transportation, processing, marketing channels, pricing mechanisms, and stakeholder participation within the NTFP value chain.
4. Seasonal Dependence and Resource Use Patterns: Evaluation of seasonal variation in NTFP availability and the extent of dependence of local communities on forest products during agricultural lean periods.
5. Sustainability and Conservation Issues: Analysis of harvesting practices, resource pressures, and local perceptions regarding sustainable utilisation and conservation of forest resources.

The findings were interpreted in the context of sustainable rural development, biodiversity conservation, and livelihood enhancement strategies for forest-dependent communities in the Bahraich district.

V. MAJOR NTFPs OF BAHRAICH DISTRICT

The forests of the Bahraich district, particularly those associated with the Katarniaghat Wildlife Sanctuary and adjoining Terai forests, support a rich diversity of Non-Timber Forest Products (NTFPs). These products provide food, medicine, fodder, construction materials, household necessities, and supplementary income to forest-dependent communities. The abundance of moist deciduous forests, riverine ecosystems, grasslands, and wetlands contributes to the availability of a wide range of economically important NTFPs. Similar observations have been reported from the Terai region of Uttar Pradesh, where forest resources play a significant role in livelihood support and rural economic development (Singh *et al.*, 2017; Shackleton *et al.*, 2011).

Table 5. Major NTFPs of Bahraich District and Their Uses

Category	Important NTFPs	Scientific Name	Major Uses
Edible Fruits	Amla	<i>Phyllanthus emblica</i>	Food, pickles, medicine
	Bael	<i>Aegle marmelos</i>	Beverage, medicine
	Jamun	<i>Syzygium cumini</i>	Food, medicinal uses
	Mahua flowers	<i>Madhuca longifolia</i>	Food, beverages, and income generation
	Tamarind	<i>Tamarindus indica</i>	Food condiment
Wild Honey and Bee Products	Ber	<i>Ziziphus mauritiana</i>	Edible fruit
	Honey	<i>Apis dorsata</i> , <i>A. cerana</i>	Food, medicine, trade
	Beeswax	Bee products	Candle and handicraft industries
Medicinal Plants	Amla	<i>Phyllanthus emblica</i>	Ayurvedic formulations
	Haritaki	<i>Terminalia chebula</i>	Digestive medicine
	Baheda	<i>Terminalia bellirica</i>	Traditional medicine
	Kalmegh	<i>Andrographis paniculata</i>	Fever and liver disorders
	Safed Musli	<i>Chlorophytum borivillianum</i>	Nutraceutical and medicinal uses
	Giloy	<i>Tinospora cordifolia</i>	Immunity booster
	Sarpagandha	<i>Rauvolfia serpentina</i>	Hypertension treatment
	Ashwagandha	<i>Withania somnifera</i>	Herbal medicine
Leaves	Sal leaves	<i>Shorea robusta</i>	Leaf plates and bowls
	Tendu leaves	<i>Diospyros melanoxylon</i>	Bidi manufacturing
	Fodder leaves	Various species	Livestock feed
	Bauhinia leaves	<i>Bauhinia variegata</i>	Fodder and packaging
	Bamboo poles	<i>Dendrocalamus strictus</i>	Construction and fencing
Bamboo and Cane Products	Bamboo shoots	<i>Dendrocalamus</i> spp.	Food
	Bamboo handicrafts	Various species	Basketry and cottage industries
	Babool gum	<i>Vachellia nilotica</i>	Pharmaceutical and food industries
Gums and Resins	Dhawda gum	<i>Anogeissus latifolia</i>	Industrial uses
	Sal resin	<i>Shorea robusta</i>	Traditional medicine and incense
	Munj grass	<i>Saccharum munja</i>	Rope making
Grasses and Fibres	Kans grass	<i>Saccharum spontaneum</i>	Thatching and handicrafts
	Bhabar grass	<i>Eulaliopsis binata</i>	Paper and rope industries
	Reeds	Wetland species	Mat weaving
Mushrooms	Wild edible mushrooms	Various species	Food and local trade
Oil Seeds and Seeds	Mahua seeds	<i>Madhuca longifolia</i>	Oil extraction
	Neem seeds	<i>Azadirachta indica</i>	Biopesticides and medicinal products
	Karanj seeds	<i>Pongamia pinnata</i>	Biofuel and medicinal uses
Fodder Resources	Grass species	Various species	Livestock feed

	Tree fodder	Multiple species	Dry season fodder
Others	Fuelwood	Various species	Domestic energy
	Broom grass	<i>Thysanolaena maxima</i>	Broom making
	Thatching materials	Grasses and reeds	House construction
	Lac (occasionally)	<i>Kerria lacca</i> associated hosts	Cottage industries

5.1 Economic Importance of NTFPs

Among the various NTFPs collected in the Bahraich district, honey, medicinal plants, bamboo, Mahua flowers, Sal leaves, Tendu leaves, fodder grasses, and wild fruits constitute the most economically significant products. Honey collection and bamboo-based handicrafts provide seasonal income opportunities, whereas medicinal plants such as *Phyllanthus emblica*, *Terminalia chebula*, *Tinospora cordifolia*, and *Withania somnifera* are increasingly traded through local herbal markets and pharmaceutical industries (TRIFED, 2023). Mahua flowers and seeds are particularly important livelihood resources in forest-fringe villages due to their multiple uses in food, traditional beverages, and oil extraction (Tewari *et al.*, 2019).

Sal leaves and Tendu leaves contribute significantly to rural household income through the manufacture of leaf plates and bidi production, respectively. Similarly, grasses such as *Saccharum munja* and *Eulaliopsis binata* support cottage industries producing ropes, mats, baskets, and handicrafts. These NTFPs not only supplement household income but also provide employment opportunities during agricultural lean seasons, thereby strengthening livelihood resilience among forest-dependent communities (Shackleton *et al.*, 2011).

The diversity and abundance of NTFPs in the Bahraich district highlight the significant role of forest ecosystems in supporting rural livelihoods and local economies. Sustainable harvesting, value addition, and improved market linkages can further enhance the contribution of these resources to poverty alleviation and rural development in the Terai region of Uttar Pradesh.

VI. ROLE OF NTFPS IN THE RURAL ECONOMY OF BAHRAICH DISTRICT

Non-Timber Forest Products (NTFPs) constitute a vital component of the rural economy in the forested regions of Uttar Pradesh, particularly in the Terai

districts such as Bahraich, Lakhimpur Kheri, Shravasti, and Pilibhit. The forests of Bahraich, especially those surrounding Katarniaghat Wildlife Sanctuary, provide a wide range of NTFPs, including medicinal plants, honey, bamboo, fodder, grasses, wild fruits, mushrooms, gums, resins, and fuelwood. These products play a significant role in sustaining livelihoods, generating employment, ensuring food security, supporting traditional healthcare systems, and empowering rural communities. Studies conducted in Uttar Pradesh indicate that NTFPs contribute substantially to household subsistence and serve as an important source of supplementary income, particularly for economically weaker sections, forest-dependent households, women, and marginal farmers (Islam & Quli, 2017; UPSBDB, 2016).

6.1 Income Generation

NTFPs provide an important source of supplementary income for rural households, especially during agricultural lean seasons when employment opportunities are limited. In the Bahraich district, products such as honey, Mahua flowers (*Madhuca longifolia*), medicinal plants, bamboo, Sal leaves (*Shorea robusta*), Tendu leaves (*Diospyros melanoxylon*), and wild edible fruits are collected and sold in local markets. Income generated from these products helps households meet daily expenses, educational costs, healthcare needs, and agricultural investments. Research in forest-dependent communities of Uttar Pradesh has shown that NTFPs can contribute between 15 and 35% of annual household income, depending on resource availability and market access (Islam & Quli, 2017). Honey collection from wild bee colonies in the Katarniaghat forests has emerged as a significant livelihood activity. Similarly, Mahua flowers and seeds are commercially valuable products that are widely traded and utilised for food, traditional beverages, oil extraction, and medicinal purposes. Medicinal plants such as *Tinospora cordifolia*,

Withania somnifera, *Asparagus racemosus*, and *Rauvolfia serpentina* also contribute to rural incomes through their sale to herbal traders and pharmaceutical industries (National Medicinal Plants Board, 2023).

6.2 Employment Generation

The NTFP sector generates substantial seasonal and year-round employment opportunities for rural communities. Employment is created not only through the collection of forest products but also through their processing, transportation, storage, packaging, marketing, and the development of value-added products. In the Bahraich district, various NTFP-related activities support local livelihoods, including:

- Collection of honey, medicinal plants, fodder, fruits, and bamboo.
- Processing of Mahua flowers, medicinal herbs, and bamboo products.
- Transportation and storage of forest produce.
- Marketing through local markets and trader networks.
- Manufacture of leaf plates, baskets, ropes, mats, and handicrafts.

The Ministry of Tribal Affairs and TRIFED have emphasised the importance of NTFPs in generating employment opportunities through Van Dhan Vikas Kendras, which promote value addition and entrepreneurship among forest-dependent communities (TRIFED, 2023). Such initiatives have the potential to strengthen rural economies while reducing dependence on wage labour and seasonal migration.

6.3 Women's Participation and Empowerment

Women constitute the primary workforce in NTFP collection and processing activities in many villages of the Bahraich district. They are actively involved in collecting medicinal plants, fuelwood, fodder, edible fruits, mushrooms, Sal leaves, grasses, and other household-use products. Women's participation is particularly significant because NTFP-related activities can be performed near villages and often require limited financial investment (Shackleton *et al.*, 2011).

Women's self-help groups (SHGs) have increasingly engaged in preparing value-added products such as

herbal medicines, leaf plates, bamboo handicrafts, honey processing, and food products derived from forest resources. Such enterprises enhance women's income, decision-making capacity, and economic independence while strengthening household livelihood security (UPSBDB, 2016). Therefore, NTFPs contribute not only to income generation but also to women's empowerment and social inclusion.

6.4 Food and Nutritional Security

Forest ecosystems in Bahraich provide a variety of edible products that supplement household nutrition and food security. Wild fruits such as Amla (*Phyllanthus emblica*), Bael (*Aegle marmelos*), Jamun (*Syzygium cumini*), Ber (*Ziziphus mauritiana*), and Tamarind (*Tamarindus indica*) are important seasonal food resources. Edible mushrooms, honey, bamboo shoots, and Mahua flowers also contribute to dietary diversity and nutritional intake among rural populations (FAO, 2017).

During periods of crop failure, floods, droughts, or seasonal food shortages, NTFPs often function as a safety net by providing alternative food sources and income opportunities. This role is particularly important in the flood-prone Terai region, where agricultural production may be affected by climatic variability and extreme weather events (Islam & Quli, 2017).

6.5 Healthcare and Traditional Medicine

NTFPs play an important role in traditional healthcare systems in Uttar Pradesh. The forests of Bahraich harbour numerous medicinal plant species that are utilised by local communities for the treatment of common ailments. Species such as *Tinospora cordifolia* (Giloy), *Withania somnifera* (Ashwagandha), *Rauvolfia serpentina* (Sarpagandha), *Terminalia chebula* (Haritaki), *Terminalia bellirica* (Baheda), and *Phyllanthus emblica* (Amla) form important components of Ayurvedic and folk medicine systems (NMPB, 2023).

Traditional knowledge associated with medicinal plants continues to be transmitted through generations and remains particularly valuable in remote villages where access to modern healthcare facilities is limited. The growing demand for herbal products and Ayurvedic medicines has further increased the economic importance of medicinal

plant-based NTFPs in Uttar Pradesh (Pandey *et al.*, 2016).

6.6 Livelihood Diversification and Rural Development

One of the most significant contributions of NTFPs is their role in livelihood diversification. Dependence on a single source of income, such as agriculture, often exposes rural households to economic risks associated with crop failures, market fluctuations, and climate variability. NTFPs provide an alternative source of income and employment that enhances household resilience and reduces vulnerability (Angelsen *et al.*, 2014).

In Bahraich district, NTFPs complement agriculture, livestock rearing, fisheries, and wage labour, thereby strengthening the overall rural economy. Sustainable management, scientific harvesting, value addition, and market development of NTFPs can significantly contribute to poverty alleviation, employment generation, women's empowerment, biodiversity conservation, and rural development in Uttar Pradesh.

VII. MARKETING AND VALUE CHAIN ANALYSIS

The marketing of Non-Timber Forest Products (NTFPs) plays a crucial role in determining the economic benefits received by forest-dependent communities. In Uttar Pradesh, particularly in the Terai districts such as Bahraich, Lakhimpur Kheri, Pilibhit, and Shravasti, NTFPs are collected primarily by rural households and subsequently marketed through a network of traders, processors, cooperatives, and government-supported agencies. Despite the rich diversity of NTFPs available in these regions, the marketing system remains largely unorganised, resulting in limited financial returns to primary collectors (Islam & Quli, 2017).

7.1 NTFP Value Chain in Bahraich District

The value chain of major NTFPs in Bahraich generally follows a multi-tier marketing structure involving several intermediaries before the products reach end consumers. The typical marketing channel is represented as:

NTFP Collector → Village Aggregator/Local Trader
→ Wholesaler → Processor/Manufacturer → Retailer
→ Consumer

In some cases, especially for medicinal plants, honey, bamboo products, and Mahua flowers, additional intermediaries may be involved. Government-supported institutions such as the Tribal Cooperative Marketing Development Federation of India (TRIFED), Van Dhan Vikas Kendras (VDVKs), Farmer Producer Organisations (FPOs), and Self-Help Groups (SHGs) are increasingly being promoted to reduce the role of intermediaries and enhance the share of profits received by collectors (TRIFED, 2023).

7.2 Marketing of Major NTFPs in Uttar Pradesh

The marketing channels vary according to the type of NTFP. Honey collected from the forests of Katarniaghat is generally sold to local traders, who supply it to processing units and regional markets. Medicinal plants such as *Tinospora cordifolia*, *Withania somnifera*, *Asparagus racemosus*, and *Phyllanthus emblica* are traded through herbal medicine dealers and pharmaceutical industries. Bamboo and grass-based products are sold directly in village markets or through handicraft cooperatives, while Mahua flowers and seeds are marketed through local traders and oil-processing units (National Medicinal Plants Board, 2023).

Recent initiatives by the Government of India under the Van Dhan Yojana have encouraged the formation of tribal and rural producer groups for value addition and direct marketing of NTFPs. These interventions aim to improve market efficiency, strengthen local enterprises, and increase the income of forest-dependent households (Ministry of Tribal Affairs, 2023).

7.3 Value Addition and Enterprise Development

Value addition is considered one of the most effective approaches for enhancing the economic contribution of NTFPs. In Uttar Pradesh, many NTFPs are still sold in raw form, limiting the income generated by local collectors. Processing and value addition can substantially increase market value.

Examples include:

NTFP	Raw Product	Value-Added Products
Honey	Raw honey	Filtered honey, branded honey, wax products
Amla	Fresh fruits	Pickles, candy, juice, powder
Mahua flowers	Dried flowers	Processed food products, beverages
Bamboo	Bamboo poles	Furniture, handicrafts, baskets
Sal leaves	Raw leaves	Plates, bowls, and biodegradable packaging
Medicinal plants	Raw herbs	Herbal medicines, extracts, powders

Studies have shown that value-added products may generate two to five times higher returns than raw materials, thereby significantly improving rural livelihoods (Pandey et al., 2016). The establishment of Van Dhan Vikas Kendras and rural processing units in forested districts of Uttar Pradesh can therefore play a critical role in enhancing local incomes and employment opportunities.

7.4 Major Constraints in NTFP Marketing

Despite their economic importance, the NTFP marketing system in the Bahraich district faces several challenges that limit livelihood benefits for local communities.

7.4.1 Lack of Storage Facilities

Many NTFPs, particularly medicinal plants, honey, mushrooms, fruits, and Mahua flowers, are highly perishable and require proper storage facilities. The absence of storage infrastructure often compels collectors to sell their products immediately after collection at lower prices (Islam & Quli, 2017).

7.4.2 Price Fluctuations

Market prices of NTFPs vary considerably due to seasonal availability, demand fluctuations, and lack of organised procurement systems. Collectors often have limited access to market information and are therefore unable to negotiate fair prices for their products (TRIFED, 2023).

7.4.3 Dependence on Middlemen

The marketing chain in many parts of Uttar Pradesh remains dominated by local traders and intermediaries. Because collectors generally lack transportation facilities, storage infrastructure, and direct market access, they are compelled to sell products to middlemen who capture a substantial portion of the final market value (Shackleton et al., 2011).

7.4.4 Limited Market Access

Remote villages located near the Katarniaghat Wildlife Sanctuary often face transportation and

connectivity challenges. Poor road infrastructure and inadequate market linkages restrict access to larger regional and national markets, thereby reducing profitability for collectors.

7.4.5 Inadequate Value Addition

A significant proportion of NTFPs collected in Bahraich are sold in unprocessed form. Lack of technical knowledge, processing equipment, packaging facilities, and entrepreneurial skills limits opportunities for value addition and enterprise development (Pandey et al., 2016).

7.4.6 Policy and Institutional Constraints

Although several government programmes support NTFP-based livelihoods, limited awareness, inadequate training, and weak institutional coordination often restrict their effectiveness at the grassroots level. Strengthening community organisations, cooperatives, and producer groups remains essential for improving market participation and livelihood outcomes (Ministry of Tribal Affairs, 2023).

7.5 Opportunities for Strengthening the NTFP Value Chain

The marketing potential of NTFPs in Uttar Pradesh can be enhanced through:

- Establishment of village-level collection and storage centres.
- Expansion of Van Dhan Vikas Kendras and Self-Help Groups.
- Development of Farmer-Producer Organisations (FPOs).
- Promotion of value-added NTFP enterprises.
- Improved market information systems and digital marketing platforms.
- Certification and branding of organic and forest-based products.
- Strengthening linkages with Ayurvedic, pharmaceutical, food-processing, and handicraft industries.

Such interventions can substantially improve income generation, employment opportunities, and livelihood security while promoting sustainable utilisation of forest resources in the Bahraich district and other forested regions of Uttar Pradesh.

VIII. CHALLENGES AND CONSTRAINTS

Despite their significant contribution to rural livelihoods, the sustainable utilisation and commercialisation of Non-Timber Forest Products (NTFPs) in Uttar Pradesh face several challenges. In forest-rich districts such as Bahraich, Lakhimpur Kheri, Pilibhit, and Shravasti, forest-dependent communities encounter socio-economic, institutional, and ecological constraints that limit the full livelihood potential of NTFPs (Islam & Quli, 2017). One of the major concerns is the unsustainable harvesting of forest resources, particularly medicinal plants, honey, fodder species, and bamboo. Excessive extraction and destructive harvesting methods often reduce regeneration capacity and threaten long-term resource availability (Pandey *et al.*, 2016). This problem is further aggravated by the limited awareness of scientific harvesting and sustainable collection practices among local collectors.

Another important challenge is the low bargaining power of NTFP collectors, who are generally small-scale gatherers with limited access to market information and organised procurement systems. Consequently, they often depend on local traders and intermediaries, receiving only a fraction of the final market price (Shackleton *et al.*, 2011). In addition, poor transportation and storage infrastructure in remote forest villages restrict access to larger markets and increase post-harvest losses, particularly for perishable products such as honey, mushrooms, and medicinal herbs.

The absence of strong cooperatives, producer organisations, and value-addition facilities further constrains income generation from NTFPs. Most forest products in Uttar Pradesh are sold in raw form, resulting in low economic returns to rural households (TRIFED, 2023). Moreover, market information gaps, fluctuating prices, and a lack of direct linkages with industries and consumers create uncertainties in NTFP trade.

The seasonal nature of NTFP availability also affects livelihood stability, as many products are collected

only during specific periods of the year. Furthermore, in protected areas such as the Katarniaghat Wildlife Sanctuary and Dudhwa Tiger Reserve landscape, wildlife conservation regulations and restricted access to forest resources may limit collection activities, creating additional livelihood challenges for forest-fringe communities (UP Forest Department, 2022).

Addressing these constraints through sustainable harvesting practices, improved market access, value addition, community-based enterprises, and institutional support is essential for enhancing the contribution of NTFPs to rural development and livelihood security in Uttar Pradesh.

IX. STRATEGIES FOR SUSTAINABLE DEVELOPMENT

The sustainable development of non-timber forest products (NTFPs) is essential for strengthening rural livelihoods, reducing poverty, and promoting biodiversity conservation in Uttar Pradesh. The forested districts of the Terai region, including Bahraich, Lakhimpur Kheri, Pilibhit, and Shravasti, possess substantial potential for NTFP-based livelihood enhancement. However, realising this potential requires coordinated interventions involving government agencies, local communities, research institutions, and market stakeholders (TRIFED, 2023; UPSBDB, 2016).

9.1 Strengthening Community-Based Institutions

The formation of NTFP cooperatives, Self-Help Groups (SHGs), Farmer Producer Organisations (FPOs), and producer collectives can improve the bargaining power of collectors and reduce dependence on intermediaries. Community-based organisations facilitate collective marketing, fair pricing, and equitable benefit-sharing while strengthening local participation in resource management (Shackleton *et al.*, 2011). Successful experiences from Van Dhan Vikas Kendras established under the Ministry of Tribal Affairs demonstrate the potential of community enterprises in increasing rural incomes through value-added forest products (TRIFED, 2023).

9.2 Promotion of Value Addition and Rural Enterprises

A significant proportion of NTFPs in Uttar Pradesh are marketed in raw form, resulting in low economic returns to collectors. Establishing village-level processing units for honey purification, medicinal plant drying, herbal product preparation, bamboo handicrafts, Mahua processing, and leaf-plate manufacturing can substantially enhance product value and generate local employment (Pandey *et al.*, 2016). Value addition has been recognised as a key strategy for increasing rural incomes and strengthening forest-based microenterprises.

9.3 Market Development and Institutional Support

Strengthening market linkages through TRIFED, Van Dhan Vikas Kendras, e-NAM platforms, cooperatives, and state marketing federations can improve access to regional and national markets. Establishment of collection centres, storage facilities, market information systems, and certification mechanisms for organic and sustainably harvested products can enhance the competitiveness of NTFPs from Uttar Pradesh (Ministry of Tribal Affairs, 2023).

9.4 Capacity Building and Sustainable Harvesting

Training programmes on sustainable harvesting, post-harvest handling, grading, packaging, and entrepreneurship development are essential for ensuring long-term resource sustainability. Scientific harvesting methods help minimise damage to plant populations and maintain ecological balance while improving product quality and market value (FAO, 2017). Extension services and awareness programmes should therefore be strengthened in forest-fringe villages.

9.5 Promotion of Medicinal Plant Cultivation

The cultivation of high-value medicinal and aromatic plants such as *Withania somnifera* (Ashwagandha), *Tinospora cordifolia* (Giloy), *Asparagus racemosus* (Shatavari), *Chlorophytum borivillianum* (Safed Musli), and *Rauvolfia serpentina* (Sarpagandha) can reduce pressure on wild populations while creating additional income opportunities for farmers. The National Medicinal Plants Board (NMPB) and AYUSH programmes have identified medicinal plant

cultivation as an important component of sustainable rural development (NMPB, 2023).

9.6 Infrastructure Development

Improved storage, transportation, drying, grading, and processing infrastructure is necessary to reduce post-harvest losses and improve product quality. Establishing community-level warehouses, cold storage facilities, and processing centres in forested districts can significantly increase the marketability and profitability of NTFPs (Islam & Quli, 2017).

9.7 Integration of Livelihoods and Biodiversity Conservation

Sustainable NTFP management should be integrated with biodiversity conservation and ecosystem restoration programmes. Community participation in forest management, habitat restoration, agroforestry, and Joint Forest Management (JFM) initiatives can simultaneously support livelihood enhancement and conservation objectives. Such an approach is particularly important in ecologically sensitive areas such as the Katarniaghat Wildlife Sanctuary and the Terai Arc Landscape, where forests provide both ecological services and livelihood resources (Uttar Pradesh Forest Department, 2022).

9.8 Policy Recommendations

The long-term sustainability of NTFPs in Uttar Pradesh requires supportive policies focusing on resource conservation, market access, value addition, community participation, and institutional strengthening. Strengthening linkages among forest departments, biodiversity boards, research institutions, cooperatives, and local communities can significantly enhance the contribution of NTFPs to rural development, livelihood security, and sustainable forest management.

X. CONCLUSION

The present study demonstrates that Non-Timber Forest Products (NTFPs) constitute an indispensable component of the rural economy of Bahraich district and the wider Terai region of Uttar Pradesh. The forests of Katarniaghat Wildlife Sanctuary and adjoining forest landscapes support a diverse range of economically important NTFPs, including honey, Mahua (*Madhuca longifolia*), Amla (*Phyllanthus*

emblica), Haritaki (*Terminalia chebula*), Baheda (*Terminalia bellirica*), bamboo, medicinal plants, fodder grasses, Sal leaves, and various edible forest products. These resources contribute significantly to household livelihoods by providing supplementary income, employment opportunities, food security, traditional healthcare, and livelihood diversification for forest-dependent communities (Islam & Quli, 2017; Shackleton *et al.*, 2011).

The study reveals that NTFPs serve as an important economic safety net for rural households, particularly marginal farmers, landless labourers, women, and economically weaker sections. Collection, processing, transportation, and marketing of NTFPs generate seasonal and year-round employment opportunities while reducing dependence on agriculture alone. Women play a crucial role in the collection and processing of medicinal plants, fuelwood, fodder, edible fruits, and leaf products, thereby contributing significantly to household economies and local resource management. Furthermore, many NTFPs provide essential nutritional and medicinal benefits, supporting food security and traditional healthcare systems in remote rural areas where access to modern facilities remains limited (FAO, 2017; NMPB, 2023).

Despite their socio-economic importance, the NTFP sector in Uttar Pradesh continues to face several challenges, including unsustainable harvesting practices, inadequate value addition, poor storage and transportation infrastructure, weak market linkages, dependence on intermediaries, limited awareness regarding sustainable resource management, and seasonal fluctuations in product availability. The study further indicates that collectors often receive only a small proportion of the final market value because of unorganised marketing systems and inadequate institutional support. Similar observations have been reported from other forest-dependent regions of India, highlighting the need for strengthening value chains and improving market access for primary collectors (Pandey *et al.*, 2016; TRIFED, 2023).

Analysis of the NTFP value chain suggests considerable opportunities for livelihood enhancement through community-based enterprises, village-level processing units, Farmer Producer Organisations (FPOs), Self-Help Groups (SHGs), and Van Dhan Vikas Kendras. Promotion of value-added

products such as processed honey, herbal medicines, bamboo handicrafts, leaf-plate products, and medicinal plant derivatives can substantially increase household incomes and create rural employment. Similarly, cultivation of high-value medicinal and aromatic plants can reduce pressure on natural populations while providing alternative income opportunities for local communities (Ministry of Tribal Affairs, 2023; NMPB, 2023).

From an ecological perspective, sustainable management of NTFPs is essential for maintaining forest biodiversity and ecosystem services in the Terai Arc Landscape. Integrating NTFP-based livelihood programmes with biodiversity conservation, habitat restoration, agroforestry, and community-based forest management can simultaneously support rural development and environmental sustainability. The conservation of forest ecosystems is particularly important in ecologically sensitive areas such as Katarniaghat Wildlife Sanctuary, where biodiversity conservation and livelihood security are closely interconnected (Uttar Pradesh Forest Department, 2022).

In conclusion, NTFPs possess immense potential for promoting sustainable rural development in Uttar Pradesh. Strengthening institutional support, improving market infrastructure, expanding value-addition initiatives, promoting sustainable harvesting practices, and enhancing community participation in resource management can significantly increase the contribution of NTFPs to income generation, employment creation, poverty alleviation, and biodiversity conservation. A holistic approach integrating livelihood improvement with sustainable forest management will not only enhance the well-being of rural communities in the Bahraich district but also contribute to the long-term ecological security and socio-economic development of the Terai region and Uttar Pradesh as a whole.

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REFERENCES

- [1] Angelsen, A., Jagger, P., Babigumira, R., Belcher, B., Hogarth, N. J., Bauch, S., Börner, J., Smith-Hall, C., & Wunder, S. (2014). Environmental income and rural livelihoods: A global-comparative analysis. *World Development*, 64, S12–S28.
- [2] Belcher, B., Ruiz-Pérez, M., & Achdiawan, R. (2005). Global patterns and trends in the use and management of commercial NTFPs: Implications for livelihoods and conservation. *World Development*, 33(9), 1435–1452.
- [3] Champion, H. G., & Seth, S. K. (1968). *A Revised Survey of the Forest Types of India*. Government of India Press, New Delhi.
- [4] Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches* (5th ed.). Sage Publications.
- [5] District Gazetteer of Bahraich. (2011). Government of Uttar Pradesh, Lucknow.
- [6] FAO. (1995). *Non-Wood Forest Products for Rural Income and Sustainable Forestry*. Food and Agriculture Organisation of the United Nations, Rome.
- [7] Forest Survey of India (FSI). (2023). *India State of Forest Report 2023*. Ministry of Environment, Forest and Climate Change, Government of India.
- [8] Islam, M. A., & Quli, S. M. S. (2017). Role of non-timber forest products in livelihood generation and rural economy in Uttar Pradesh. *International Journal of Current Microbiology and Applied Sciences*, 6(10), 1812–1820.
- [9] Jhala, Y. V., Qureshi, Q., & Nayak, A. K. (2021). Status of Tigers, Co-predators and Prey in India. National Tiger Conservation Authority and Wildlife Institute of India.
- [10] Krueger, R. A., & Casey, M. A. (2015). *Focus Groups: A Practical Guide for Applied Research* (5th ed.). Sage Publications.
- [11] Ministry of Tribal Affairs. (2023). *Van Dhan Yojana: Value Addition and Marketing of Minor Forest Produce*. Government of India.
- [12] National Medicinal Plants Board (NMPB). (2023). *Medicinal Plants Database and Conservation Strategy*. Ministry of AYUSH, Government of India.
- [13] Pandey, A. K., Tripathi, Y. C., & Kumar, A. (2016). Non-timber forest products (NTFPs) for sustained livelihood: Challenges and strategies. *Research Journal of Forestry*, 10(1), 1–7.
- [14] Shackleton, C. M., Delang, C. O., & Angelsen, A. (2011). From subsistence to safety nets and cash income: Exploring the diverse values of non-timber forest products for livelihoods and poverty alleviation. In *Non-Timber Forest Products in the Global Context* (pp. 55–81). Springer.
- [15] Singh, R., & Gupta, P. K. (2017). Forest resource utilisation and livelihood dependence in

- the Terai region of Uttar Pradesh. *Indian Journal of Ecology*, 44(2), 356–362.
- [16] Singh, R., Verma, P., & Gupta, A. (2017). Floristic diversity and forest composition of the Terai region of Uttar Pradesh. *Indian Forester*, 143(7), 645–654.
- [17] Singh, S., & Singh, A. (2019). Soil characteristics and agricultural productivity of the Terai region of Uttar Pradesh. *Journal of Soil and Water Conservation*, 18(2), 120–126.
- [18] Tewari, D. D., Campbell, J. Y., & Bhattarai, B. (2019). Non-timber forest products and rural livelihood enhancement in South Asia. *Journal of Sustainable Forestry*, 38(4), 321–340.
- [19] TRIFED. (2023). Mechanism for Marketing of Minor Forest Produce through Minimum Support Price (MSP) and Value Chain Development. Tribal Cooperative Marketing Development Federation of India, Government of India.
- [20] Uttar Pradesh Forest Department. (2022). Management Plan of Katarniaghat Wildlife Sanctuary. Government of Uttar Pradesh.
- [21] Uttar Pradesh State Biodiversity Board (UPSBDB). (2016). Sustaining People and Their Livelihoods through Biodiversity Conservation. Government of Uttar Pradesh.
- [22] WWF-India. (2020). Terai Arc Landscape Conservation Programme. World Wide Fund for Nature–India.