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SPECIES DIVERSITY, TRADITIONAL UTILIZATION AND SOCIO-DEMOGRAPHIC DETERMINANTS OF NON-TIMBER FOREST PRODUCTS AMONG THE TARAO TRIBE OF MANIPUR

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ABSTRACT

The present study was carried out from May 2023 to April 2024 to assess the diversity, utilization patterns, and conservation status of non-timber forest products (NTFPs) used by the Tarao tribe of Chandel and Tengnoupal districts, Manipur. A total of 62 NTFP species were documented from the study area. Trees constituted the dominant life form (45.16%), followed by herbs (29.03%) and climbers (14.51%), while shrubs (8.06%) and grasses (3.22%) were comparatively less represented. Medicinal plants formed the largest use category (38.70%), followed by wild edibles (25.80%) and bamboo and cane resources (12.90%). Other categories included fibre-yielding, resin and gum-producing, aromatic plants and tubers. Regarding conservation status, the majority of species were categorized as least concern (61.29%) and not evaluated (27.41%), whereas a smaller proportion fell under vulnerable (6.45%) and near threatened (4.83%) categories. The findings indicate a strong dependence of the Tarao community on forest ecosystems for subsistence, traditional healthcare, construction materials and supplementary income. The predominance of medicinal plants highlights the continued relevance of traditional ecological knowledge. However, the occurrence of conservation-sensitive species suggests potential threats arising from extraction pressure and socio-economic transitions. The study underscores the ecological and socio-cultural importance of NTFPs and emphasizes the need for sustainable management strategies integrating traditional knowledge with scientific conservation approaches to ensure long-term biodiversity conservation and livelihood security.

(Key words: Non-timber forest products, Tarao tribe, sustainable utilization, species diversity, ethnobotany)

INTRODUCTION

Chandel and Tengnoupal districts of southeastern Manipur, India, are ecologically diverse, hilly regions bordering Myanmar (Anonymous, 2019). Geographically located between 23.49°-24.28° N and 94.09°-94.31° E, the forest-dominated landscape supports rich biodiversity and sustains local livelihoods (Nongmaithem and Das, 2018; Rana, *et al*., 2010; and Singh *et al*., 2025). According to the Anonymous (2011), the combined population of the present-day Chandel and Tengnoupal districts was 144,182 prior to administrative bifurcation, with Tengnoupal accounting for 59,110 individuals. These demographic characteristics significantly influence patterns of forest resource dependence.

The Tarao tribe, primarily residing in Tarao Laimanai, Leishokching, Khuringmul, and Heikakpokpi villages, maintains a close relationship with forest ecosystems. Non-Timber Forest Products (NTFPs), including medicinal plants and wild edibles, form an essential component of their livelihood and healthcare system. Wild and underutilized fruit species also contribute significantly to nutritional security and livelihood diversification in forest-dependent communities (Mehta *et al*., 2022). Traditional ecological knowledge guides sustainable harvesting and utilization practices (Kala, 2005; Berkes, 1999), though modernization and forest degradation increasingly threaten biodiversity and knowledge transmission (Nath *et al*., 2022; Teegalapalli *et al*., 2009).

This study documented NTFP species diversity, traditional utilization patterns, and socio-demographic determinants influencing forest dependence among the Tarao tribe of Manipur.

MATERIALS AND METHODS

Study area

The research was conducted in Chandel and Tengnoupal districts of southeastern Manipur, bordering Myanmar, particularly in villages inhabited by the Tarao

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community. Owing to its subtropical monsoon climate and rich biodiversity, the region is highly suitable for ethnobotanical studies. Fieldwork was carried out from May 2023 to April 2024, covering both pre-monsoon and monsoon seasons to ensure optimal availability of medicinal plant species.

Data collection

Ethnobotanical data were collected through structured and semi-structured interviews along with participatory observation. Knowledgeable informants were selected using purposive sampling and information on local plant names, Sanskrit names, habit, use category, major uses, conservation status, and livelihood relevance was recorded.

Plant collection and identification

Medicinal plants reported by informants were collected from nearby forests and village areas during field surveys. Each specimen was labeled with its local name, collection date, and habitat. Identification was carried out using standard floras of Northeast India (Sinha, 1996; Sinha, 1987) and verified at the Department of Botany, Waikhom Mani Girls College. Voucher specimens were prepared following standard herbarium techniques and deposited in the college herbarium for future reference.

RESULTS AND DISCUSSION

The present study documented a total of 62 Non-Timber Forest Product (NTFP) species utilized by the Tarao tribe of Chandel and Tengnoupal districts, Manipur. Trees constituted the dominant life form (45.16%), followed by herbs (29.03%) and climbers (14.51%), while shrubs (8.06%) and grasses (3.22%) were comparatively less represented. Medicinal plants formed the largest use category (38.70%), followed by wild edibles (25.80%) and bamboo and cane resources (12.90%). Other categories such as fibre-yielding, resin and gum-producing, aromatic plants and tubers collectively accounted for the remaining proportion. With respect to conservation status, the majority of species were categorized as least concern (61.29%) and not evaluated (27.41%), while a small proportion fell under vulnerable (6.45%) and near threatened (4.83%) categories.

The high diversity of NTFPs recorded in the study reflects the ecological richness of the forested landscapes of Chandel and Tengnoupal districts and the strong dependence of the Tarao tribe on surrounding forest ecosystems (Nongmaithem *et al*., 2018; Rana *et al*., 2010; and Singh *et al*., 2025). The predominance of tree species suggests reliance on perennial forest resources for food, medicine, construction and income generation. At the same time, the substantial use of herbs and climbers indicates extensive knowledge of understorey vegetation and seasonal plant availability. The dominance of medicinal plants among use categories underscores the continued importance of traditional healthcare systems within the community (Kala, 2005). The reliance on plant-based remedies for common ailments demonstrates the persistence of traditional ecological knowledge (TEK) (Berkes, 1999). Wild edible species contribute significantly to nutritional security, especially during periods of agricultural scarcity, thereby reinforcing their subsistence value (Mehta *et al*., 2022). Economically important species such as bamboo, cane, and resin-producing plants indicate that NTFPs serve both subsistence and commercial functions. However, the occurrence of vulnerable and near threatened species suggests that increasing extraction pressure, habitat alteration, and modernization may pose risks to long-term sustainability (Teegalapalli *et al*., 2009; Nath *et al*., 2022). Furthermore, generational shifts in knowledge transmission may affect the continuity of traditional practices. Overall, the findings highlight the integral role of NTFPs in sustaining the socio-economic and cultural framework of the Tarao tribe. Sustainable management strategies that integrate traditional knowledge with scientific conservation approaches are essential to ensure biodiversity conservation and livelihood security in the region.

Table 1. Documented non-timber forest product species and their ethnobotanical uses among the Tarao tribe of Manipur

Sl. No.	Scientific name	Sanskrit name	Local name	Family	Habit	Use category	Major uses	Conserva -tion status	Livelihood relevance
1	*Agave americana* (L.)	Kantala	Kewa	Asparagaceae	Shrub	Forest fibre	Strong fibre extraction; ropes, mats, cordage	LC	Fibre
2	*Ageratum conyzoides* (L.)	Visamustih	Khongjai napi	Asteraceae	Herb	Wild medicinal	Wound healing; anti - inflammatory; folk medicine	NE	Folk remedy
3	*Amaranthus spinosus* (L.)	Tanduliya	Chengkruk	Amaranthaceae	Herb	Wild edible plants	Leafy vegetable; nutritive green; fodder	NE	Seasonal vegetable
4	*Andrographis paniculata* (Burm.f.) Wall.	Kalamegha	Bhubati	Acanthaceae	Herb	Wild medicinal	Febrifuge; liver tonic; immune stimulant	NE	Herbal tonic
5	*Artocarpus lakoocha* Wall.	Lakucha	Harikonthong	Moraceae	Tree	Wild edible fruits	Edible fruit; pickle; traditional medicine	LC	Local trade
6	*Asparagus racemosus* Willd.	Shatavari	Nunggarei	Asparagaceae	Climber	Wild medicinal	Medicinal root; reproductive tonic; adaptogen	NE	Medicinal root
7	*Baccaurea ramiflora* Lour.	Undocumente	Motok hei	Phyllanthaceae	Tree	Wild edible fruits	Edible seasonal fruit; minor market trade	LC	Seasonal fruit
8	*Bambusa balcooa* Roxb.	Vamsha	Saneibi	Poaceae	Grass	Bamboo and cane	Construction; scaffolding; handicrafts	NE	Construction
9	*Bambusa tulda* Roxb.	Vansah	Saneibi	Poaceae	Grass	Bamboo and cane	Basketry; weaving; household items	LC	Basketry
10	*Boswellia serrata* Roxb. ex Colebr.	Kunduru	Dhup	Burseraceae	Tree	Gum	Gum resin (frankincense); anti-inflammatory medicine	LC	Gum market
11	*Calamus floribundus* Griff.	Vetasa	Lee	Arecaceae	Climber	Bamboo and cane	Cane for handicrafts and furniture	LC	Handicraft
12	*Calamus tenuis* Roxb.	Vetasa	Yaisang	Arecaceae	Climber	Bamboo and cane	Cane furniture; weaving; craft industry	LC	Cane furniture
13	*Canarium strictum* Roxb.	Mandadhupa	Mekruk	Burseraceae	Tree	Resin	Fibre; toddy (sap); jaggery preparation	VU	Resin trade
14	*Caryota urens* (L.)	Mada	Kwana	Arecaceae	Tree	Fibre		LC	Fiber and sap
15	*Centella asiatica* (L.)	Mandukaparni	Peruk	Apiaceae	Herb	Wild medicinal	Brain tonic; wound healing; leafy vegetable	LC	Wild medicinal vegetable
16	*Chenopodium album* (L.)	Vastuka	Monsaobi	Amaranthaceae	Herb	Wild edible plants	Nutritive leafy vegetable; fodder	NE	Nutritive green
17	*Cinnamomum verum* (J.) Presl.	Daruchini	Ushingja	Lauraceae	Tree	Wild aromatic / spice	Aromatic bark; spice; medicinal use	LC	Aromatic bark

18	*Cinnamomum tamala* Buch.-Ham.	Tejapatra	Tej patta	Lauraceae	Tree	Wild aromatic / spice	Leaf spice (bay leaf); flavoring agent	LC	Spice
19	*Clerodendrum colebrookianum* Walp.	Undocumente	Kuthap	Lamiaceae	Shrub	Wild medicinal	Hypertension control; traditional medicine	NE	BP control medicine
20	*Colocasia esculenta* (L.) Schott	Kachu	Paan	Araceae	Herb	Corm	Edible corm and leaves; staple vegetable; livestock fodder	NE	Corm and leaves
21	*Costus speciosus* (J. Koenig) Sm.	Khusta	Khongban takhellei	Costaceae	Herb	Wild medicinal	Rhizome used for diabetes, fever, skin diseases; anti - inflammatory	LC	Medicinal rhizome
22	*Curcuma aromatica* Salisb.	Vanaharidra	Lam yaingang	Zingiberaceae	Herb	Wild medicinal	Medicinal and cosmetic rhizome; skin care; wound healing	NE	Cosmetic and medicinal rhizome
23	*Dendrocalamus giganteus* Munro	Vansa	Maribob	Poaceae	Grass	Bamboo and cane	Construction material; scaffolding; furniture; edible shoots	LC	Structural
24	*Dendrocalamus hamiltonii* Nees & Arn. ex Munro	Undocumente	Saneibi	Poaceae	Grass	Bamboo and cane	Housing material; fencing; basketry; edible shoots	LC	Housing
25	*Diplazium esculentum* (Retz.) Sw.	Undocumented	Okang	Athyriaceae	Fern	Wild edible plants	Edible young fronds; marketed leafy vegetable	NE	Marketed fern
26	*Dioscorea alata* (L.)	Alukam	Haa	Dioscoreaceae	Climber	Tuber	Edible tuber; food security crop; famine food	NE	Food security
27	*Dioscorea bulbifera* (L.)	Aluka	Lam-haa	Dioscoreaceae	Climber	Tuber	Wild edible tuber; traditional food; medicinal uses	LC	Wild tuber food
28	*Eclipta prostrata* (L.)	Markava	Uchi-sumbal	Asteraceae	Herb	Wild medicinal	Liver tonic; hair oil preparation; wound healing	NE	Liver remedy
29	*Elaeocarpus floribundus* Blume	Rudraksha	Chorphon	Elaeocarpaceae	Tree	Wild edible fruits	Edible fruit; local consumption; minor trade	LC	Wild edible
30	*Ficus hispida* (L.f.)	Kakodumbara	Ashi-heibong	Moraceae	Tree	Wild edible fruits	Edible fruits; traditional medicine (digestive disorders)	LC	Wild fruit
31	*Ficus racemosa* (L.)	Udambara	Heibong	Moraceae	Tree	Wild edible fruits	Edible and medicinal fruit; diabetes and digestive remedy	LC	Medicinal fruit
32	*Ficus religiosa* (L.)	Ashvattha	Sana khongnang	Moraceae	Tree	Latex	Latex for traditional medicine; ritual and religious use	LC	Latex and ritual

33	*Ficus semicordata* Buch.-Ham.	Kakodumbara	Heibong	Moraceae	Tree	Wild edible fruits	Edible fruits; fodder; local consumption	LC	Edible fruit
34	*Garcinia cowa* Roxb.	Vrikshamla	Heibung	Clusiaceae	Tree	Wild edible fruits	Sour fruit for pickles; digestive aid; local trade	LC	Pickle trade
35	*Garcinia pedunculata* Roxb. ex Buch.-Ham.	Amlavetasa	Heibung	Clusiaceae	Tree	Wild edible fruits	Sour condiment; digestive medicine; culinary use	LC	Sour condiment
36	*Hedychium coronarium* (J.) Koenig	Saugandhika	Loklei	Zingiberaceae	Herb	Wild medicinal	Medicinal rhizome; ornamental flower; essential oil	NE	Ornamental and medicinal
37	*Hedychium spicatum* Buch.-Ham.	Karchura	Takhellei hangampal	Zingiberaceae	Herb	Wild medicinal	Rhizome for respiratory disorders; aromatic medicine	LC	Herbal medicine
38	*Justicia adhatoda* (L.)	Vasaka	Nongmangkha - angouba	Acanthaceae	Shrub	Wild medicinal	Leaf extract for cough, asthma, bronchitis	LC	Cough medicine
39	*Kaempferia galanga* (L.)	Chandramoolika	Leibak lei	Zingiberaceae	Herb	Wild medicinal	Rhizome for stomach disorders; spice; ethnomedicine trade	NE	Ethnomedicine income
40	*Leucas aspera* (Willd.) Link	Dronapushpi	Mayang lembung	Lamiaceae	Herb	Wild medicinal	Fever remedy; insect repellent; traditional medicine	NE	Traditional medicine
41	*Litsea cubeba* (Lour.) Pers.	Kurpura-parijata	Me-gala	Lauraceae	Tree	Wild aromatic / spice	Aromatic fruits; essential oil extraction; spice	LC	Essential oil
42	*Livistona jenkinsiana* Griff.	Undocumented	Palm	Arecaceae	Tree	Forest fibre and multipurpose palms	Leaves for plate -making, thatching, weaving	NT	Leaf plates
43	*Melocanna baccifera* (Roxb.) Kurz	Vansa	Moubiwa	Poaceae	Grass	Bamboo and cane	Edible shoots; construction; handicrafts	LC	Shoots & craft
44	*Malhotra maderaspatana* (L.) Cogn.	Vatsakshi	Lamthabi	Cucurbitaceae	Climber	Wild edible plants	Leaf vegetable; traditional food	NE	Leaf vegetable
45	*Musa balbisiana* Colla	Bhimkol	Laphu	Musaceae	Herb	Forest fibre and multipurpose palms	Fibre extraction; leaf plates; fodder; edible flower	NE	Fibre
46	*Myrica esculenta* Buch.-Ham. ex D.Don	Katphala	Nonganghei	Myricaceae	Tree	Wild edible fruits	High-value edible fruit; juice and medicinal use	LC	High-value fruit

47	*Oenanthe javanica* (Blume) DC.	Paniturasi	Komprek	Apiaceae	Herb	Wild edible plants	Fresh leafy vegetable; medicinal herb	NE	Fresh vegetable
48	*Oxalis corniculata* (L.)	Changeri	Yensil	Oxalidaceae	Herb	Wild edible plants	Edible sour leaves; digestive remedy	NE	Edible leaves
49	*Paederia foetida* (L.)	Gandhaprasarini	Oinam	Rubiaceae	Climber	Wild medicinal	Leafy vegetable; digestive and anti -inflammatory medicine	NE	Wild edible and medicinal
50	*Persicaria chinensis* (L.) H.Gross	Undocumented	Angom yensil	Polygonaceae	Herb	Wild edible plants	Leaf vegetable; traditional medicine	NE	Wild vegetable
51	*Phyllanthus amarus* Schumach. & Thonn.	Bhumyamalaki	Chakpa - heikru	Phyllanthaceae	Herb	Wild medicinal	Liver disorders; jaundice treatment; antiviral herb	NE	Liver medicine
52	*Piper longum* (L.)	Pippali	Uchithi	Piperaceae	Climber	Wild aromatic / spice	Medicinal spice; respiratory disorders; digestive stimulant	LC	Medicinal spice
53	*Phyllanthus emblica* (L.)	Amalaki	Heikru	Phyllanthaceae	Tree	Wild medicinal	Vitamin-rich fruit; Triphala ingredient; nutraceutical	LC	Nutraceutical fruit
54	*Shorea robusta* Gaertn.	Shala	Sal	Dipterocarpacea e	Tree	Resin	Sal resin; incense; traditional medicine	LC	Sal resin
55	*Sterculia urens* Roxb.	Katira	Kulu	Malvaceae	Tree	Resin	Gum karaya extraction; pharmaceutical and food stabilizer	LC	Natural gum
56	*Syzygium cumini* (L.) Skeels	Jambulah	Jam	Myrtaceae	Tree	Wild edible fruits	Edible fruit; anti-diabetic remedy; seed powder medicine	LC	Nutraceutical
57	*Terminalia bellirica* (Gaertn.) Roxb.	Bibhitaki	Bahera	Combretaceae	Tree	Wild medicinal	Triphala ingredient; cough and digestive medicine	LC	Triphala trade
58	*Terminalia chebula* Retz.	Haritaki	Manahi	Combretaceae	Tree	Wild medicinal	Triphala ingredient; laxative; antimicrobial	LC	Triphala trade
59	*Tinospora cordifolia* (Willd.) Hook.f. & Thomson	Guduchi	Ningthou khonglee	Menispermacea e	Climber	Wild medicinal	Immunity booster; anti-diabetic; febrifuge	NE	Immunity booster
60	*Vitex negundo* (L.)	Nirgundi	Urik-sibi	Lamiaceae	Shrub	Wild medicinal	Anti-inflammatory leaves; pain relief; insect repellent	LC	Anti-inflammatory
61	*Zanthoxylum acanthopodia* DC.	Tikshnapatraka	Mukthrubi	Rutaceae	Shrub	Wild medicinal	Aromatic fruits as spice; dental care; digestive medicine	LC	Condiment
62	Zingiber zerumbet Roscoe. ex Sm.	Karpura-harida	Shingkhang	Zingiberaceae	Herb	Rhizome	Medicinal rhizome; anti - inflammatory; traditional healing	NE	Traditional healing

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