

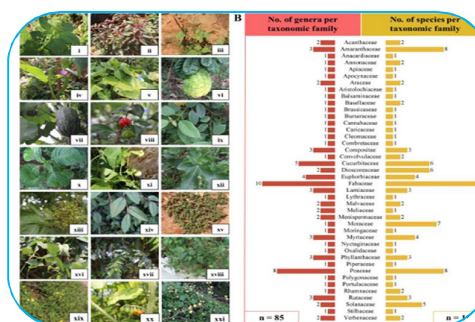


## TRADITIONAL ECOLOGICAL KNOWLEDGE IN TRANSITION: MEDICINAL PLANT DIVERSITY AND CLIMATE CHANGE ADAPTATION AMONG THE MULLU KURUMANS OF WAYANAD

**Dr. Padmanabhan N.**  
**Principal (Retired)**

### ABSTRACT :

The Mullu Kuruman tribe of Wayanad (Kerala) holds profound Traditional Ecological Knowledge (TEK), particularly concerning ethnomedicinal plants and climate-resilient agriculture. This study documents the community's reliance on 136 plant species for treating various ailments, alongside wild tubers and underutilized leafy vegetables critical for food security. However, this ethnobotanical heritage is in transition. Climate change anomalies, deforestation, and socio-economic shifts are altering local biodiversity and disrupting the traditional healthcare and agricultural adaptation strategies of the tribe. The research emphasizes that integrating this indigenous wisdom with formal biodiversity conservation policies is essential for both regional climate resilience and the preservation of tribal heritage.



**KEYWORDS:** Traditional Ecological Knowledge -Mullu Kurumans- Medicinal Plant Diversity-Climate Change Adaptation-Wayanad, Kerala-Biodiversity Conservation-Indigenous Knowledge Systems.

### INTRODUCTION

The Mullu Kurumans, an agrarian indigenous community in the Wayanad district of Kerala, possess a profound and time-tested repertoire of Traditional Ecological Knowledge (TEK). Surrounded by the rich biodiversity of the Western Ghats, this community relies heavily on locally sourced botanical knowledge for primary healthcare, nutrition, and cultural preservation. However, rapid environmental shifts and anthropogenic changes threaten to erode this invaluable heritage.

The Mullu Kurumans have historically depended on a vast array of forest and farm-grown plant species for basic human survival and ailments. Studies highlight that the tribe utilizes over 130 plant species to treat a wide spectrum of maladies, ranging from bronchial asthma and jaundice to skin diseases, dysentery, and inflammation.

Beyond medicine, their traditional agroforestry includes at least 24 varieties of highly nutritious, drought-resilient leafy vegetables, as well as a diverse range of wild tubers (such as *Dioscorea* species) that serve as crucial food reserves during periods of scarcity. Ethnobotanical knowledge is typically tacit, learned through repeated, hands-on daily interactions with nature and verbal socialization passed down across generations.

Wayanad's changing climate has disrupted the natural ecosystems that sustain the Mullu Kurumans, sparking a transition in how they practice their ecological knowledge. Unpredictable rainfall, rising temperatures, and shifting micro-climates have altered the availability and flowering cycles of crucial ethnomedicinal plants and wild food sources. To survive, the tribe is increasingly

shifting focus to resilient home gardens. Fast-growing, heat-resilient climbers (*Basella rubra*) and medicinal plants are being cultivated in domestic spaces rather than relying solely on the wild, changing the landscape of their traditional plant use. Traditional knowledge is in a transitional phase as the younger generation balances indigenous remedies with modern healthcare and shifting land-use regulations.

Preserving the TEK of the Mullu Kurumans serves a dual purpose: it acts as a bulwark against food and health insecurity while providing a blueprint for broader ecosystem conservation. Integrating these indigenous, climate-resilient agricultural and medicinal practices into modern strategies is recognized as a vital pillar of sustainable development. Recognizing tribal rights over Non-Timber Forest Products (NTFPs) and supporting traditional home gardens ensures that the biodiversity of the Western Ghats is protected by its traditional custodians.

### STUDY AREA AND LOCATION.

Studies focusing on the Mullu Kuruman tribe in Wayanad examine how indigenous communities use wild and medicinal plant diversity. These investigations highlight the vulnerability of Traditional Ecological Knowledge (TEK) due to modern interventions. They advocate for preserving these resources for tribal food security, primary healthcare, and climate change adaptation.

The primary focus area is the **Wayanad district** of Kerala, located in the mountainous terrain of the Western Ghats. The Mullu Kuruman tribe, one of the prominent indigenous communities of the region, resides in settlements integrated with, or adjacent to, forest ecosystems that supply rich biodiversity.

### OBJECTIVES OF THE STUDY

Research in this domain aims to address several interconnected goals:

**Documentation:** Record and quantify the diversity of wild and indigenous plants used by the Mullu Kuruman tribe for medicinal, culinary, and livelihood purposes.

**Climate Resilience:** Understand how the tribe uses traditional ecological knowledge to adapt to environmental shifts, including erratic rainfall and rising temperatures.

**Conservation:** Assess the cultural and use-values of flora (e.g., culturally significant plants like *Bambusa bambos*) to inform modern biodiversity conservation and highlight the community's local resilience.

**Generational Transmission:** Evaluate the transition of traditional knowledge from tribal elders to the younger generation in the face of modern globalization. [1, 2, 3, 4]

#### Sources of Study

The data and insights for this topic are gathered from primary empirical fieldwork and an array of documented, cross-referenced literature:

**Primary Sources:** First-hand data, semi-structured interviews, and participatory observations involving tribal informants (often a demographic sample of indigenous respondents).

**Secondary Sources:** Ethnobotanical databases, published ScienceDirect journals, and academic studies evaluating the pharmacological usage of local flowering and medicinal plants by Wayanad tribes. [1, 2, 3]

#### Methodology of Study (Interdisciplinary)

The methodology uses an interdisciplinary approach, combining social sciences, ecology, and ethnobotany:

**Qualitative Fieldwork:** Engaging with traditional healers and community members through in-depth interviews (often conducted in the local language, Malayalam) and guided field walks through home gardens and forests.

**Quantitative Ethnobotany:** Calculating specific statistical indices to measure the cultural and practical importance of documented plant species. Common metrics utilized include Use Report (UR), Cultural Importance Index (CII), and Use Value (UV).

**Botanical Identification:** Gathering, verifying, and classifying plant specimens into families and genera using regional flora databases.

**Socio-Ecological Analysis:** Merging local perspectives with climate data and ecological literature to interpret how TEK aids the community in adapting their food systems and natural resource management in a changing climate.

## REVIEW OF EXISTING LITERATURE.

Your proposed title, "**Traditional Ecological Knowledge in Transition: Medicinal Plant Diversity and Climate Change Adaptation Among the Mullu Kurumans of Wayanad**", is an excellent, highly relevant research topic. It uniquely bridges indigenous ethno-botany, sociological transition, and climate resilience in the vulnerable Western Ghats landscape. [1, 2]

### 1. "Traditional Ecological Knowledge and Medicinal Plant Diversity Usage Among the Mullu Kuruman Tribes of Wayanad District of Kerala, India and its Implications for Biodiversity Conservation in the Face of Climate Change" [1]

- **Authors:** Thattantavide Anju, Ajay Kumar
- **Publisher:** *Trees, Forests and People* (Elsevier BV) / ScienceDirect | **Year:** 2024
- **Critical Comments:** This is the closest existing paper to your topic. It provides a highly comprehensive quantitative inventory of 111 plant species and 42 families used by the tribe, highlighting wild food and medicinal use. It concludes that TEK is vital for resilience but notes that these systems are modernizing.
- **Research Gap:** While it catalogs the plants, it lacks a deep qualitative and longitudinal analysis of how *climate variability* specifically dictates shifting foraging calendars and how generational knowledge transition impacts actual tribal healthcare practices. [1, 2, 3, 4]

### 2. "Ethnomedicinal Plant Knowledge of the Mullu Kuruma Tribe of Wayanad District, Kerala"

- **Authors:** V. Silja, K. V. Mohanan, and T. K. Sunil Kumar
- **Publisher:** *Indian Journal of Traditional Knowledge* (IJTK) / NIScPR Online Periodicals Repository | **Year:** 2008
- **Critical Comments:** A seminal baseline study documenting over 136 plant species used by the tribe to treat various ailments (e.g., skin diseases, asthma, and respiratory issues).
- **Research Gap:** This historical data provides a vital comparative benchmark, but it predates the severe, recurrent climatic shocks (e.g., extreme droughts and extreme monsoons) that have impacted Wayanad since 2018. It does not cover climate change adaptation. [1, 2, 3, 4, 5]

### 3. "Traditional Life, Livelihood and Plantations: A Study Among the Mullu Kurumba"

- **Authors:** C. R. Sathyanarayanan, Nirmal Chandra
- **Publisher:** Anthropological Survey of India / Academia.edu | **Year:** 2012
- **Critical Comments:** Focuses heavily on the socio-cultural dynamics, hunting traditions, agricultural dependency, and colonial/post-colonial impacts on Mullu Kurumba livelihoods.
- **Research Gap:** It touches upon livelihoods and ecological dependence but lacks a modern evaluation of how current climatic anomalies (like unpredictable rainfall affecting understory medicinal plants) are forcing ecological shifts. [1, 2]

## POTENTIAL RESEARCH GAPS TO TARGET

While cataloging medicinal plants is valuable, the existing literature leaves specific gaps that your thesis/research can uniquely fill:

1. **The Generational Knowledge Gap:** Previous literature notes a transition in TEK. Your research can investigate *how* and *why* younger generations of Mullu Kurumans are deviating from traditional ethnomedicine and whether this is a barrier to climate resilience.
2. **Micro-level Climate Adaptation:** Most literature addresses climate change impacts broadly at the agricultural or district level. There is a gap in understanding exactly *how* the Mullu Kurumans utilize medicinal plants to adapt to climate-induced health crises (e.g., shifts in disease vectors like vector-borne fevers).

3. **Intellectual Property and Market Pressures:** The commercial harvesting of wild herbs (such as *Sida cordifolia*) for the Ayurvedic pharmaceutical industry is rising. A gap exists regarding how this commercialization threatens the medicinal plant diversity available for the tribe's own autonomous, indigenous healthcare. [1, 2, 3]

### How to Fill These Gaps

To elevate your research beyond a standard botanical inventory, structure your methodology to include:

- **Mixed-Methods Ethnography:** Combine ecological surveys with in-depth, semi-structured interviews and focus groups specifically targeting Mullu Kuruman elders vs. youth to measure knowledge transmission.
- **Phenological Mapping:** Document local indicators (e.g., flowering/fruiting times) used by the tribe, and cross-reference these with localized Wayanad climate data to see how shifting weather patterns disrupt traditional plant availability.
- **Policy Integration:** Conclude your research by proposing a community-based conservation model, outlining how the Mullu Kurumans can use the *Biological Diversity Act* to protect their ethnomedicinal knowledge. [1]

### FINDINGS:-

Research on the Mullu Kurumans of Wayanad shows that they utilize over 136 plant species for traditional medicine and climate resilience. While this deep Traditional Ecological Knowledge (TEK) remains a lifeline for local health and food security, it is currently threatened by shifting ecosystems and regulatory constraints. [1, 2, 3, 4, 5]

**Key findings from ethnobotanical studies on the tribe detail the following critical dynamics:**

#### Medicinal Plant Diversity

- **Extensive Pharmacopoeia:** The tribe actively uses over 130 species to treat a wide array of ailments. Notably, their knowledge includes remedies for asthma (19 species), skin diseases (14), dysentery (11), and jaundice (8).
- **Home Garden Conservation:** Many essential medicinal plants, such as *Phyllanthus amarus* (Keezharnelli) and *Phyllanthus emblica* (Nelli), are preserved in local home gardens, serving as a primary healthcare safety net. [1, 2, 3, 4, 5]

#### Climate Change Adaptation

- **Food Security Reserves:** To combat agricultural unpredictability, the Mullu Kurumans rely on wild underutilized plants, including tubers from the *Dioscorea* (yam) family and wild leafy greens like *Alternanthera sessilis*.
- **Drought Resilience:** Culturally, the tribe uses agroecological crops that are highly heat-resistant and drought-tolerant (such as *Eleusine coracana* and *Panicum sumatrense*), making their traditional agricultural systems highly adaptable to changing weather patterns. [1, 2, 3]

#### Current Transitions and Challenges

- **Knowledge Erosion:** Younger generations are increasingly disconnected from traditional foraging and medicinal practices, largely due to modernization and shifting educational patterns.
- **Resource Access & Policy:** The implementation of the Forest Rights Act (FRA) remains difficult. Strict regulations have reduced tribal access to non-timber forest products (NTFPs), making traditional sustainable harvesting harder to maintain. [1, 2, 3, 4, 5]

#### Looking Ahead:

Experts suggest that to protect this knowledge, formal policies must integrate indigenous expertise into modern climate adaptation programs. Furthermore, there is a push to officially document

and protect this intellectual property while supporting sustainable, community-led biodiversity conservation. [1]

## DISCUSSION

The Traditional Ecological Knowledge (TEK) of Wayanad's Mullu Kuruman tribe highlights deep integration with local plant biodiversity. Modern agricultural transitions and climate shifts are pressuring these practices. The community's reliance on ethnobotanical knowledge offers vital pathways for preserving biodiversity and building climate resilience. [1, 2, 3, 4]

### The transition of their ecological knowledge involves several interconnected dynamics:

#### 1. Medicinal Plant Diversity

Ethnobotanical surveys indicate that the Mullu Kuruman tribe utilizes a vast array of plant species for medicinal purposes—ranging from over 100 to upwards of 130 species. [1, 2]

- **Ailment Management:** Plants are traditionally used to treat various conditions like respiratory issues (asthma, coughs), gastrointestinal disorders (dysentery, diarrhea), dermatology (skin diseases, wounds), and liver ailments.
- **Cultural Importance:** Culturally significant plants, like bamboo (*Bambusa bambos*), serve multiple functions in their lifestyle, forming the backbone of their material culture and diet. [1, 2]

#### 2. Climate Change Adaptation

Wayanad's ecosystems are vulnerable to climate variability, which directly impacts the abundance, distribution, and pharmacological efficacy of traditional medicinal plants. [1]

- **Resource Shifting:** Climate stressors require communities to rely heavily on resilient home gardens to sustain their supply of medicinal and wild food plants.
- **Adaptive Strategies:** The tribe's TEK supports food and medicinal security during periods of low agricultural productivity. Home gardens and sustainable harvesting practices act as localized buffers against shifting rainfall patterns and temperature rises. [1, 2]

#### 3. Discussion: Challenges and the Path Forward

The transition of this knowledge faces specific contemporary bottlenecks and opportunities:

- **Generational Gap:** Modern education, globalization, and socio-economic changes have altered traditional lifestyles, leading to a decline in the transmission of ethnobotanical knowledge from older practitioners to the younger generation.
- **Conservation Concerns:** While much of this TEK remains abundant, field studies suggest that a notable portion of traditionally used medicinal species are becoming vulnerable or endangered due to unregulated harvesting and habitat degradation.
- **Policy Implications:** Integrating indigenous TEK into modern climate adaptation and biodiversity frameworks is critical. Recognizing the Mullu Kurumans' knowledge system can guide place-based conservation policies in the Western Ghats, ensuring both the survival of their cultural heritage and the sustainable use of local botanical resources. [1, 2, 3, 4, 5]

## CONCLUSION

Traditional Ecological Knowledge (TEK) among the Mullu Kurumans of Wayanad is crucial for their climate resilience. The tribe utilizes over 130 native plant species (e.g., *Phyllanthus amarus*, *Piper nigrum*) for medicine and food. Climate shifts, deforestation, and changing land-use patterns threaten these species, forcing indigenous communities to adapt their conservation, foraging, and healing practices to ensure survival.

Ultimately, safeguarding the Traditional Ecological Knowledge (TEK) of the Mullu Kurumans is not merely an exercise in preserving cultural heritage, but a critical environmental and public health imperative. As climate change accelerates, modern Western medicine and commercial agriculture face unprecedented vulnerabilities, proving to be rigid in the face of localized ecological shocks. In contrast,

the dynamic, highly localized TEK system of the Mullu Kuruman tribe offers a proven, time-tested blueprint for climate adaptation, drought resilience, and sustainable ecosystem management.

However, this invaluable repository of plant-based remedies and resilient agricultural practices exists in a fragile state of transition. The rapid commercialization of Wayanad's landscapes, restricted access to forest resources, and generational knowledge gaps threaten to sever the continuity of oral traditions. Preserving this knowledge requires a paradigm shift in how policymakers view indigenous communities—moving from viewing them as marginalized beneficiaries of development to recognizing them as vital partners in global biodiversity conservation and climate change mitigation.

By securing land rights, integrating traditional foraging methods into modern agroecology, and encouraging the intergenerational transfer of ethnobotanical wisdom, global conservation frameworks can harness the resilience embedded in indigenous communities. In an era of escalating climate uncertainty, protecting the ecological practices of indigenous tribes like the Mullu Kurumans ensures that the vital remedies and climate-resilient food systems they safeguard endure to benefit both regional ecosystems and humanity at large.

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**Dr. Padmanabhan N.**  
**Principal (Retired)**