

Mishing Indigenous Knowledge and Sustainable Tourism: A Framework for Biodiversity Preservation in Assam's Floodplains

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Abstract

The Mishing people of the Brahmaputra Valley are one of the most resilient riverine cultures in the Eastern Himalayas. As climate change increases the rate and intensity of floods in Assam, traditional "gray" engineering approaches, such as embankments and spurs, have proved to be less than effective. This paper examines the potential for the integration of Mishing traditional architecture, in particular the Chang Ghar, and sustainable resource use into a "Village Tourism" model. It is suggested that by packaging the "experience" of indigenous sustainability, rather than simply the landscape, Assam can develop a sustainable model of biodiversity conservation that resists the incursion of destructive "gray" infrastructure.

Keywords: Mishing, Sustainable Tourism, Biodiversity, Indigenous.

1. Introduction

Assam is home to the Brahmaputra, a river characterized by its braided nature and high sediment load. The floodplains of the Brahmaputra River in Assam, north-eastern India, are globally recognized for their ecological richness. These dynamic landscapes support a vast array of flora and fauna, from migratory birds in the Dibru–Saikhowa wetlands to rare species like the Gangetic dolphin (*Platanista gangetica*) in braided river channels. Their fertile alluvial soils underpin complex agro-ecological processes that have sustained human communities for centuries. Among these communities, the Mishing (also spelled *Mishing*, historically known as *Miri*) are one of the largest Indigenous groups in Assam. Centered along riverine belts and low-lying floodplain tracts, the Mishing have a deep cultural and ecological connection to the riverine world. Their traditional knowledge systems — encompassing seasonal calendars, floodplain cultivation methods, fisheries management, forest resource use and spiritual worldviews — have contributed to resilient subsistence strategies adapted to periodic inundation.

While the state government often focuses on flood *control*, the Mishing focus on flood *adaptation*. Their worldview—deeply rooted in Donyi-Polo (animistic worship of Sun and Moon)—treats the river as a kin member. Unlike sedentary agricultural societies that view floods as "disasters," the Mishing perceive the flood pulse as a necessary ecological event for soil rejuvenation. This paper argues that the survival of the Mishing is not a result of "luck," but of a sophisticated, inherited system of Disaster Management (DM) that integrates architectural flexibility with biological observation. This paper also tries to explore how Indigenous ecological knowledge of the Mishing can be synergized with sustainable tourism approaches to support biodiversity preservation in Assam's floodplains.

Objective of the Study:

The present paper aims to:

- Examine the possibilities of "Sustainable Village Tourism" as a strategic livelihood source for the community.
- Develop a conceptual framework for the integration of these practices into tourism planning, facilitated through participatory governance structures, capacity development, and benefit sharing.
- Identify policy pathways and community engagement mechanisms that can operationalize this framework.

Methodology:

The research paper employs an interdisciplinary methodology, which combines concepts from Indigenous studies, sustainable tourism literature, ecological conservation theory, participatory governance, and regional case studies. The research paper combines secondary sources of information, such as ethnographies, policy documents, ecological studies,

and tourism frameworks, to develop a culturally grounded, ecologically informed, and socially inclusive model of sustainable tourism planning.

The data collected is analyzed both qualitatively and quantitatively. The information is systematically organized in order to identify, analyze, and report on patterns related to the theme.

Strategic Livelihood Sources of Mishing Community:

a) Vernacular Architecture as Structural Mitigation:

Bamboo (*Bambusa tulda* and *Bambusa balcooa*) is used vehemently as the basic material as ecologically too bamboo has a huge carbon sink. Every Mishing community has a community forest basically full with bamboo tress and the resources for building materials comes from this forest specifically laying the foundation pillars of 'Chang Ghar' a traditional mishing house. In a 3,000-word essay, it is necessary to emphasize that a conventional Mishing dwelling is made of renewable materials that can be composted back into the riverine soil at the end of their life span. The dwelling is raised on a platform with bamboo or concrete stilt supports, typically 8 to 12 feet above ground level.

The community has the traditional knowledge of calculating the High Flood Level (HFL) by analysing the height of nest of the birds and insects. The community retains an oral tradition of the highest flood level of the last 20 years. For instance if in 2024 flood level reached 6 feet, in 2026 structure is elevated to 8 feet. Further because of the hydrodynamic Design of the 'Chang Ghar', the bamboo stilt supports have very little resistance to water currents. Unlike concrete walls that can be "undermined" by the strength of the current, the stilt supports allow water and sediment to pass through, maintaining the soil structure beneath the dwelling.

The thatch roof of the Chng Ghar is typically composed of Ulu Kher (*Imperata cylindrica*), it has excellent thermal insulation properties, keeping the interior much cooler than the damp 35°C outside environment, thus reducing the need for cooling.



The traditional Chang Ghar

- **Material Resilience: Bamboo vs. Concrete**
Although contemporary trends emphasize the need for concrete, research conducted by SEEDS India (2017-2024) indicates that the bamboo home is more likely to withstand the test of time. This is because the material has a high degree of elasticity, which enables it to "bend but not break" in the event of high-velocity winds or pre-monsoon storms (Bordoicila as traditionally said in Assamese language). Moreover, the homes are modular, meaning that they can be disassembled in a matter of hours and moved if the riverbank is eroding—a factor that brick-and-mortar homes do not have.

The following table offers the "Carbon and Cost" information necessary to validate the sustainability of the Mishing method.

Feature	Vernacular Chang Ghar (Mishing)	Modern RCC (Concrete/Brick)
Primary Materials	Bamboo, Cane, Thatch, Timber	Cement, Steel, Burnt Bricks
Carbon Footprint	Negative/Neutral (Bio-materials sequester CO ₂)	High (Cement/Steel production is carbon-intensive)
Thermal Comfort	Naturally ventilated; thatch roof reduces heat by 3–5°C	High thermal mass; requires fans/AC in summer
Flood Response	Permeable: Water passes under; no "dam effect"	Resistant/Barrier: Diverts water to neighbors; prone to silt-clogging
Maintenance	High (Repair needed every 5–8 years)	Low (until structural cracking occurs)
Post-Life Cycle	100% Biodegradable (becomes organic mulch)	Non-biodegradable debris (landfill waste)
Construction Cost	₹80,000 – ₹1.5 Lakh (Local labor/materials)	₹8 Lakh – ₹15 Lakh (Industrial materials)

- The 'Meram' and Material Longevity:

The Meram is placed in the middle of the main hall. Although its main function is cooking, its function in nature is preservation. The smoke produced by the wood fire goes up to the bamboo roofing and the bamboo rafters. This is a natural process that preserves the bamboo from wood-boring beetles and fungi. This natural process, which is "chemical-free," prolongs the life of the materials from 3 years to more than 10 years, thus lessening the need for resource extraction from the nearby forests.



The Meram

- Early Warning Systems (EWS) and Biological Indicators:

Prior to the satellite-based SMS warning system which is being used in the present times to make people aware about the natural hazards, the Mishing community from a long time relied on Biological Indicators to initiate evacuations. Few signs that are followed by mishing community are:

- Zoological Indicators: The ants and termites' migration to the top rafters of a dwelling is an unmistakable indicator of rising groundwater levels. Likewise, the birds' nesting sites at higher altitudes are an indicator of the intensity of the impending monsoon.
- Hydrological Signs: The change in water color from clear to a deep, rich brown indicates intense rainfall in the Arunachal Himalayas, giving the village a 24-to-48-hour lead time to prepare.
- Social Warning Networks: The Murong Ghar (community house) is the command center. The announcements made there by the village elders (Gaon Buras) initiate a social response, including the construction of country boats (Khel) and rafts (Bhul) from banana tree trunks.



- Agro-Ecological Adaptation and Food Security:

Disaster management is not complete without addressing food security in the post-disaster scenario. For communities living in flood-prone regions, developing resilient agricultural practices is essential to withstand recurring natural hazards.

The Mishing community of Assam has demonstrated remarkable ingenuity by adopting a unique agricultural system that minimizes the risk of food shortages following floods. Central to this system is the cultivation of deep-water rice, locally known as *Bao Dhan*. Unlike conventional rice varieties, *Bao Dhan* possesses an extraordinary adaptive characteristic: as floodwaters rise, the plant rapidly elongates its stem, sometimes growing several inches within a single day, allowing its leaves to remain above the water surface. This exceptional adaptation enables the crop to survive prolonged inundation, ensuring a stable harvest even during severe floods. By integrating this resilient rice variety into their traditional agricultural cycle, the Mishing community has effectively reduced the vulnerability of their food production system, illustrating how indigenous knowledge and ecological adaptation can play a vital role in post-disaster food security and sustainable disaster management.

During the prolonged immersion, the community uses water hyacinth and organic matter to establish floating seedbeds to ensure the production of vegetables even when the land is not visible. Moreover the community makes use of the "gift of the silt" to plant Rabi crops immediately after the water drains out, thus making a disaster a time of great agricultural productivity.



- **Fishing Methods and Resource Management:**

Fishing constitutes one of the principal livelihood activities of the Mishing community and serves as an important source of food, nutrition, and household income. Living in the floodplains of the Brahmaputra and its tributaries, the Mishings have developed sophisticated fishing practices that reflect their deep understanding of riverine ecology, seasonal hydrological changes, and the life cycles of aquatic species. Their indigenous fishing knowledge has evolved over generations and emphasizes the sustainable use of aquatic resources rather than indiscriminate exploitation. One of the traditional methods employed by the community is *Bagha*, a form of net fishing that utilizes finely crafted indigenous nets designed to selectively capture mature fish while allowing juvenile fish and fingerlings to escape. This practice helps preserve breeding populations, supports natural fish regeneration, and contributes to the long-term sustainability of local fisheries.

Another widely practiced technique is hook-and-line fishing, which is carefully synchronized with the seasonal migration and behavioral patterns of different fish species. Fishers possess detailed knowledge of the habitats, feeding habits, and migratory routes of commercially and nutritionally important species, enabling them to target specific fish at appropriate times of the year. This selective approach minimizes unnecessary bycatch and reduces pressure on non-target species.

Equally significant is the community's observance of seasonal fishing restrictions based on traditional ecological knowledge. The Mishings recognize the breeding and spawning periods of several indigenous fish species, including hilsa and other migratory fishes, and traditionally refrain from intensive fishing during these critical reproductive seasons. By allowing fish to reproduce undisturbed, these customary conservation practices facilitate the replenishment of fish stocks and help maintain the ecological balance of rivers, wetlands, and floodplain ecosystems. Such indigenous resource management strategies demonstrate how traditional knowledge can contribute to biodiversity conservation, sustainable livelihoods, and long-term food security while strengthening community resilience in ecologically sensitive landscapes.



Few Fishing Equipments

These practices are an example of resource regulation, which ensures that there is no overfishing and thus the sustainability of fish resources. The community also has floodplain sanctuaries, which are sacred areas where fishing and hunting are limited.

Findings:

Sustainable Village Tourism: A New Paradigm

The flood plains of Assam, formed by the dynamic discharge of the Brahmaputra River and its tributaries, are ecologically fragile areas that are rich in biodiversity and cultural resources. The flood plains support wetlands, riverine forests, aquatic life, migratory birds, and agricultural land. The Mishing community, one of the largest Indigenous communities, inhabits these flood plains and has traditionally developed ecological knowledge to coexist with natural floods. The integration of Indigenous knowledge with sustainable tourism offers a promising approach for biodiversity conservation and improving livelihoods.

Transition from Mass Tourism to "Life-experience" Tourism: The tourist industry earns money from the community's special relationship with nature, and this money is invested in protecting the very nature (flood plains) that attracts the tourists.

Infrastructure: The "Green" Lodging Standard

Instead of typical hotels, the model focuses on Vernacular Homestays.

- Biodiversity Link: By mandating that tourist accommodations should be upgraded to Chang Ghars, the model ensures that the land is permeable. Concrete prevents groundwater recharge, but bamboo stilts do not.
- Resource Management: The use of bamboo in construction encourages villagers to preserve "Home Forests" or groves, thus enhancing the village's green cover and carbon sink capacity.

Ethno-Ecological Guiding & Biodiversity Education

Mishing youth are transformed from "laborers" to "Custodians of Knowledge."

- Idea: Tourists are not mere spectators; they are "Climate Witnesses." Guiding focuses on the Mishing people's ability to explain river behavior, point out migratory birds, and understand the medicinal value of riparian plants.
- Scientific Integration: Guiding scripts should include the scientific name of species mentioned, along with the Mishing name (e.g., Lesser Adjutant Stork, or Hargila in Mishing).
- Effect: When a community understands that a standing forest or a pristine Beel (wetland) generates more income through "Eco-Trails" than from cutting down the forest or commercial fishing, conservation becomes a self-fulfilling prophecy.

Assam's floodplains, shaped by the dynamic flow of the Brahmaputra and its tributaries, constitute ecologically sensitive landscapes rich in biodiversity and cultural heritage. These floodplains support wetlands, riverine forests, aquatic species, migratory birds, and fertile agricultural zones. The Mishing community, one of the largest Indigenous groups inhabiting these floodplain regions, has historically developed adaptive ecological knowledge that enables sustainable coexistence with recurrent floods. Integrating this Indigenous knowledge with sustainable tourism offers a promising pathway for biodiversity preservation while supporting local livelihoods.



Glimpse of such Wetlands

Agri-Tourism and Genetic Conservation: An Academic Approach

The Mishing tribe has an elaborate gene bank of flood-resistant crop varieties. This is incorporated into the tourism system through the “Visitor Experience.”

- Seed-to-Table Experience: Visitors are exposed to traditional planting and harvesting rituals, particularly the Ali-Aye-Ligang.
- Economic Incentive: Tourists are ready to pay a premium for “Heritage Rice” (Bao Dhan) and organically grown river vegetables. This creates a high-end market niche that prevents farmers from using chemically intensive and high-yielding varieties that can contaminate the river and have a negative impact on the aquatic life.

The Pulse-Flood Seasonal Tourism Strategy: Reconceptualizing Monsoonal Tourism in Assam

Traditional tourism systems in Assam have traditionally considered the monsoon season as a “closed season.” The proposed synergy approach promotes Monsoon Tourism.

- Navigational Tourism: During flood seasons, the village is navigated by traditional country boats (Khel), allowing tourists to see and experience a community that persists on the water rather than migrating.
- Survival Experience: Showcases of how the Mishing community uses the Perop (hanging shelves) for food security and how livestock are raised on raised platforms, thus increasing global awareness of Indigenous Disaster Management.
- Economic Incentive for Preservation: Economic incentives from tourism-based survival experiences of a virgin, traditional village create a financial incentive for the community to preserve wetlands and forests surrounding the village rather than converting them into commercial monocultures (such as palm oil or tea plantations).

The Contribution of Women to Household Food Security in the Mishing Community:

The key contributors to Household Food Security are Women. Notably, two closely linked practices are responsible for maintaining Household Food Security:

- The Perop: This is a suspended bamboo platform above the Meram (hearth) used for the storage of seeds, dried fish, and fermented rice. Its elevated position and constant exposure to smoke ensure that it remains dry even during floods.
- Weaving as an Economic Buffer: During the flood season, when access to the fields is difficult, women enhance their weaving (Miri designs). The woven materials serve as a valuable liquid asset that can be readily converted or sold to procure necessary commodities.



Traditional Weaving Practices

Policy Recommendations and the “Synergy” Framework:

By shifting the focus of the Chan g Ghar from being a poverty indicator to a climate change adaptation success story, Assam is able to protect its unique biodiversity while also empowering a remarkably vibrant people. To move from traditional success to a full-fledged Sustainable Tourism initiative, the government must use a multi-tiered policy approach

- a. Assam Tourism Development Corporation (ATDC): Move past simple registration and implement a Bio-Cultural Rating Scale.
 - Criteria: Houses built using a minimum of 80% indigenous, biodegradable materials (bamboo, cane, thatch) qualify for a “Gold Leaf” rating.
 - Reward: Greater visibility on government procurement websites and lowered luxury taxes. This policy will encourage Mishing youth to maintain their traditional architecture instead of adopting concrete “Tourist Lodges.”
- b. Community-Based Conservation Zones (CBCZ):

The state must use tourism earnings to support “Beel Restoration Funds.”

Methodology: A 5% Conservation Cess on all homestay bookings must be paid into a village-controlled fund.

- Application: The money is used to eradicate the invasive water hyacinth in the local wetlands, ensuring that the ecological conditions necessary for the biodiversity-target species, such as the Lesser Adjutant Stork and the Great Indian Hornbill, are maintained.
- c. The “Bio-Guide” Accreditation:

In order to counter the potential rise of “Vulture Tourism” fueled by third-party agents, the government must require accreditation for local Mishing guides.

- Training: Guides must be trained not only in historical subjects but also in Ethno botany, allowing them to describe how riverine plants are used in Mishing medicine and how the Mishing people preserve the riparian zone. This will transform tourism from a simple sightseeing experience into an educational seminar.

d. Special Preservation Model:

- Indigenous Heritage Zones: Mishing riverine settlements must be declared "Protected Bio-Cultural Zones," where RCC construction is prohibited in favor of improved bamboo architecture.
- Digital Repository: Tourism money must be used to create a digital map of Mishing ethno botanical knowledge.
- GI Tagging: GI tags must be sought for Mishing handlooms and traditional drinks to increase their value in the international tourism industry.

The Way Forward:

In the ever-changing riverine system of Assam, the process of acculturation becomes a subtle promoter of vulnerability. The out-migration of Mishing youth and their subsequent preference for Reinforced Cement Concrete (RCC) structures, driven by the belief that such architectural styles are representative of modernity and thus a status symbol, leads to the abandonment of the traditional Chang Ghar (stilt house) model and, as a consequence, a loss of resilience at the village scale. These concrete structures, which are naturally unsuitable for riverine areas, become heat traps because of their high thermal capacity and create barriers to water flow, thus contributing to water logging and collapse when the Brahmaputra floods its banks.

At the same time, the integration of sustainable and community-led ecotourism becomes a vital counter-narrative to this trend by rediscovering indigenous identity. When the scaling up of activities such as homestays and agro-ecotourism takes place, indigenous knowledge is transformed from a 'backward' practice to a highly valued intellectual and cultural capital. By using Indigenous Ecological Knowledge (IEK) to manage tourism, such that the carrying capacity of the wetlands is defined, activities are aligned with the biological rhythms of the seasons, and strict zoning is maintained, the community can protect the floodplain habitats from the usual degradation caused by mass tourism. This synergy, therefore, lifts the Mishing community from being passive inhabitants to active ecological custodians and participants in governance. The paper finds that biodiversity conservation and cultural maintenance are not compromised for the sake of economic development but, on the contrary, are the very engines of resilience in the face of growing environmental and development pressures in Assam's socio-ecological systems.

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