

Indigenous Cultural Landscapes of Karnali Province: Preservation, Transformation, and Sustainability

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Abstract

The preservation, transformation, and sustainability of indigenous cultural landscapes in Karnali Province, Nepal, reflect a dynamic relationship between communities, traditional knowledge systems, and the natural environment. These landscapes embody centuries of cultural practices, settlement patterns, agricultural systems, spiritual beliefs, and ecological stewardship developed by Indigenous and local communities. This study explores the preservation, transformation, and sustainability of Karnali's indigenous cultural landscapes amid modernization, migration, infrastructure development, climate change, and socio-economic transitions. It examines how traditional institutions, customary resource management practices, and sacred ecological values have historically supported biodiversity conservation and sustainable livelihoods. However, expanding road networks, urbanization, tourism, and external cultural influences are transforming indigenous architecture, land-use patterns, and socio-cultural identities. Despite these pressures, local communities demonstrate resilience through adaptive practices that integrate traditional ecological knowledge with contemporary development needs. The study argues that sustainable preservation requires meaningful community participation, supportive policies, cultural revitalization, and environmentally sensitive development. Recognizing indigenous knowledge as a valuable resource for sustainable development can strengthen cultural continuity, biodiversity conservation, and ecological sustainability. The study concludes that balancing preservation and transformation is essential for sustaining Karnali's distinctive indigenous cultural heritage and landscapes.

Keywords: cultural landscapes, sustainability, traditional livelihoods, sustainable development

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Introduction

Karnali Province represents one of Nepal's most distinctive socio-ecological environments, where topography, ecosystems, agrarian systems, human settlements, and indigenous knowledge frameworks remain deeply integrated (Nepal Development Research Institute, 2023; Rössler, 2006). Long-term sustainability requires adaptive stewardship that protects cultural heritage while enabling communities to respond effectively to climate variability, economic transformation, infrastructure expansion, demographic mobility, and market integration. Such an approach can strengthen cultural continuity, support sustainable livelihoods, enhance ecological resilience, and ensure the continued vitality of indigenous cultural landscapes across Karnali Province (Taylor & Lennon, 2011).

The Cultural Landscape as a Living System

Indigenous cultural landscapes in Karnali extend far beyond built heritage, encompassing traditional pastoral corridors, forest ecosystems, terraced agricultural networks, sacred geographic formations, hydrological sources, customary governance bodies, oral histories, linguistic traditions, ethnobotanical knowledge, seasonal mobility patterns, and ritual practices. The highland rangelands of northern Karnali exemplify this integration, designated by the provincial Rangeland Management Strategy as essential ecological assets intertwined with cultural and spiritual identity. Locations such as Mahabu Patan in Kalikot and Limi Lapcha in Humla embody cultural narratives and spiritual significance connected to specific topographical features, while seasonal livestock movement between high-altitude summer pastures and lower winter grazing zones functions simultaneously as an economic subsistence strategy, an ecological adaptation mechanism, and a medium for cultural continuity (Berkes et al., 2003; Nepal Development Research Institute, 2023).

This paradigm shifts the core inquiry of heritage management: rather than asking how traditional culture can be conserved in isolation, the primary objective becomes sustaining the ecological and social conditions that enable cultural reproduction (Rössler, 2006; Taylor & Lennon, 2011).

Preservation: Strengths and Measurable Cultural Assets

Karnali maintains substantial cultural capital, as documented in the provincial study *Ethnicity, Language and Cultural Prosperity of Karnali Province*, which recorded regional diversity through field investigations conducted between November 2018 and May 2019 to support equitable social and cultural development. The primary mechanism for safeguarding this heritage is community-based transmission rather than institutional museumification; expertise concerning livestock husbandry, ethnobotany, agrarian systems, forestry management, vernacular architecture, oral history,

and ritual topography is traditionally passed across generations through active participation in daily subsistence activities (UNESCO, 2025).

The Raute community illustrates both the persistence and vulnerability of these frameworks. According to National Human Rights Commission findings and the 2021 census, the national Raute population stands at 566 individuals, with 147 residing within Karnali Province, while targeted field surveys identified 137 individuals maintaining a continuous nomadic lifestyle. This population preserves customary leadership structures via the Mukhiya system alongside specialized knowledge of forestry, hunting, artisanal production, and trade (National Human Rights Commission of Nepal, 2024; National Statistics Office, 2023).

Key Preservation Metrics:

Karnali Province has a total population of 1,688,412 and exhibits considerable linguistic diversity, with more than 32 recorded languages spoken across the province. The Raute population is estimated at 566 nationally, of whom 147 reside within Karnali Province. However, a field survey verified 137 individuals belonging to the nomadic Raute community. Historically, transhumance practices were also widespread among the Pahari and Bhotia communities, with approximately 99% of historical communities residing below elevations of 3,000–3,300 meters reported to have participated in such practices.

These metrics indicate that cultural conservation must be integrated directly into broader developmental strategies rather than treated as a peripheral heritage activity (United Nations, 2015).

Transformation: Climate, Migration, and Modernization

The cultural landscapes of Karnali are experiencing accelerated structural transformation. Anthropogenic climate change modifies the ecological baselines required for traditional practices, with recent studies on indigenous food systems in Nepal documenting rising thermal averages, irregular monsoon cycles,

shortened winter durations, increased drought frequency, wildfires, and water scarcity. Although communities increasingly adopt drought-resistant, pest-tolerant, and hybrid agricultural varieties, these shifts demand additional financial resources, labor inputs, and technological access, thereby straining traditional knowledge transmission and cultural continuity (GC et al., 2025).

Rangeland management systems reflect comparable vulnerabilities. Traditional transhumance is declining due to shifting generational priorities regarding pastoralism, compounded by grazing restrictions within designated community forests that limit access to historical migratory pathways. This dynamic extends beyond the cessation of a single economic activity, threatening intergenerational knowledge transfer, community cohesion, and the symbolic significance of regional landscapes.

Land use alterations provide additional quantitative indicators. Geospatial analyses of the transboundary Karnali River Basin in 2020 revealed that forests constituted 33.44% of the area, bare ground 30.29%, shrublands and grasslands 18.5%, agricultural land 13.12%, snow and ice cover 4.36%, water bodies 0.3%, and built environments 0.03%. Between 1990 and 2020, 4.07 square kilometers of forest were converted to agriculture, 3.31 square kilometers of agricultural land transitioned to built environments, and 2.82 square kilometers of snow and ice melted into water bodies, driven by a combination of anthropogenic pressures and climatic shifts (Shrestha et al., 2022).

Consequently, modernization processes yield mixed outcomes. Improved transportation networks, educational access, market integration, and public

service delivery mitigate regional isolation and socioeconomic deprivation. However, risks emerge when modernization severs communities from the ecological and institutional frameworks necessary for the reproduction of cultural knowledge.

Sustainability: From Preservation to Adaptive Stewardship

The most viable trajectory involves community led landscape stewardship that integrates indigenous knowledge with empirical scientific frameworks rather than treating them as antithetical systems. This approach aligns with UNESCO assessments, which emphasize that indigenous knowledge in Nepal constitutes a vital resource for climate adaptation and biodiversity conservation (Gautam et al., 2025).

Recent institutional initiatives reflect this methodological shift. The Asian Development Bank's climate resilient landscapes and livelihoods project seeks to enhance watershed management across approximately 200,000 hectares, benefiting roughly 50,000 rural households distributed across 24 municipalities within five districts of Karnali and Sudurpashchim provinces. Additionally, a four year program authorized by the Green Climate Fund prioritizes ecosystem restoration, sustainable forestry and landscape governance, inclusive livelihoods, and local adaptive capacity. The efficacy of such investments must be evaluated through both environmental restoration metrics and cultural sustainability indicators (Green Climate Fund, 2026; National Trust for Nature Conservation, 2026).

A Practical Sustainability Framework

A comprehensive regional strategy for Karnali can be structured across five core dimensions.

Table 1

Key Indicators for Assessing the Sustainability of Indigenous Cultural Landscapes

Dimension	Key Indicator	Desired Direction
Cultural Continuity	Number of active cultural and linguistic transmission programs	↑
Indigenous Knowledge	Documentation and community-controlled knowledge repositories	↑

Dimension	Key Indicator	Desired Direction
Landscape Health	Ecological condition of forests, rangelands, and water sources	↑
Livelihood Resilience	Proportion of households with diversified, climate-resilient income	↑
Community Governance	Indigenous participation in landscape-level decision-making	↑

Ensuring community ownership remains paramount. While external entities may provide technical documentation, financial capital, technological support, and research infrastructure, local populations must retain decision-making authority concerning culturally sensitive assets and territories. Nepal's REDD+ safeguard framework formally recognizes the necessity of respecting indigenous heritage, traditional knowledge systems, customary governance, and culturally significant practices through participatory protocols.

For highly vulnerable groups such as the raute, long-term sustainability requires a rights based framework wherein developmental interventions preclude forced cultural assimilation. Public service delivery encompassing healthcare, water infrastructure, sanitation, education, and social protection must be structured to respect community mobility, cultural identity, and self-determination. The demographic decline of the Raute population from 618 individuals in 2011 to 566 in 2021 serves as a critical indicator that cultural preservation and human wellbeing are fundamentally interdependent (National Statistics Office, 2023).

Research Gap and Contribution

The cultural landscapes of Nepal's Karnali Province represent a significant repository of indigenous heritage, defined by the historical co-evolution of human societies and their biophysical environments. This socio-ecological relationship is maintained through traditional ecological knowledge (TEK), customary institutions, sacred belief systems, and localized resource management practices. Spanning terraced agricultural regimes, transhumance pastoral systems, sacred groves,

communal irrigation networks, vernacular architecture, and ritualized spaces, these socio-ecological structures constitute a dynamic interface between indigenous communities and their surrounding ecosystems.

Contemporary pressures including rapid socioeconomic transitions, anthropogenic climate change, demographic shifts driven by rural to urban migration, infrastructural expansion, and global market integration are restructuring these landscapes, raising critical questions regarding their structural integrity, adaptive capacity, and long-term viability. Within contemporary geographic and heritage scholarship, cultural landscapes are conceptualized not merely as static physical topographies, but as dynamic archives of human memory, cultural identity, and ecological wisdom. Globally, indigenous cultural landscapes are increasingly prioritized as critical reservoirs of biological diversity, cultural heritage, and adaptive environmental practices, demonstrating how localized communities have historically managed natural resources sustainably while fostering social cohesion.

International policy frameworks increasingly emphasize the necessity of safeguarding indigenous knowledge systems and cultural landscapes as foundational pillars of sustainable development. This shift is evident in the conceptual frameworks established by UNESCO (2008, 2021), the International Council on Monuments and Sites (ICOMOS, 2017) principles concerning rural heritage, and the United Nations (2015) 2030 Agenda for Sustainable Development.

Despite their documented socio-ecological value, these landscapes face compounding pressures. The rapid acceleration of rural outmigration, shifting livelihood strategies, linear infrastructure development such as road networks, unregulated tourism, and market-driven agricultural intensification exacerbated by intensifying climate variability profoundly alter traditional spatial and social structures (Mishra & Ananda, 2022; Ananda et al., 2025). While certain transformations foster infrastructural connectivity and economic diversification, they concurrently threaten intergenerational knowledge transmission, biodiversity conservation, and the viability of customary resource governance.

Although existing literature addresses indigenous knowledge, traditional agricultural systems, and localized biodiversity conservation in Nepal, a critical gap persists in integrative, landscape-scale research. Prior scholarly efforts have frequently bifurcated ecological conservation and cultural heritage studies, omitting an analysis of how Karnali's indigenous landscapes are concurrently preserved, transformed, and negotiated amid modernization. Empirical evidence remains scarce regarding the precise mechanisms through which communities navigate socioeconomic transitions, how traditional institutions buffer systemic shocks to maintain landscape resilience, and how policy instruments can be designed to support decentralized, sustainable landscape governance. Addressing this academic deficit is essential for formulating integrated conservation policies that respect indigenous sovereignty while achieving sustainable development objectives.

Research Objectives

To critically analyze the indigenous cultural landscape of Karnali Province through the dimensions of preservation, transformation, and sustainability, with a specific focus on the interconnected dynamics among traditional knowledge, cultural practices, natural resource management, settlement configurations, livelihood

strategies, collective identity, and contemporary socioeconomic and environmental transitions.

Methodology

This methodology establishes an integrated, mixed methods research design, and socio ecologically grounded framework for analyzing the indigenous cultural landscapes of Karnali. By combining quantitative household surveys with qualitative narratives. The approach respects indigenous knowledge systems while providing practical, policy relevant insights for sustainable mountain development and community led landscape conservation.

A mixed methods framework is uniquely suited for this inquiry because indigenous cultural landscapes represent highly complex social ecological systems (SES). These systems cannot be adequately captured through a singular epistemological lens; they require the evaluation of measurable bio-physical and socio-economic indicators alongside the interpretation of subjective cultural values, ancestral belief systems, traditional ecological knowledge (TEK), and local lived experiences.

The target population for this study is stratified into distinct socio-ecological stakeholder groups to capture a holistic cross section of the landscape's human dimensions namely indigenous and local households, traditional leaders, custodians, and elders, religious and cultural practitioners, customary and Community Forest User Groups (CFUGs), farmers, women and youth demographics, institutional actors to identify information rich actors.

Results and Discussion

The indigenous cultural landscapes of Karnali Province, extending from the historically significant Sinja Valley to the alpine high altitude commons, function as dynamic socio-ecological systems rather than passive or static heritage reserves. These landscapes seamlessly integrate customary governance, spiritual traditions,

ecological stewardship, and subsistence practices into a unified matrix.

Within this framework, preservation safeguards ancestral memory through the protection of indigenous languages, oral traditions, and sacred

geographies; transformation drives adaptive resilience in response to climate change and market pressures; and sustainability establishes an optimal equilibrium where biological richness and cultural diversity mutually reinforce one another.

Figure 1

Karnali's Living Cultural Landscape

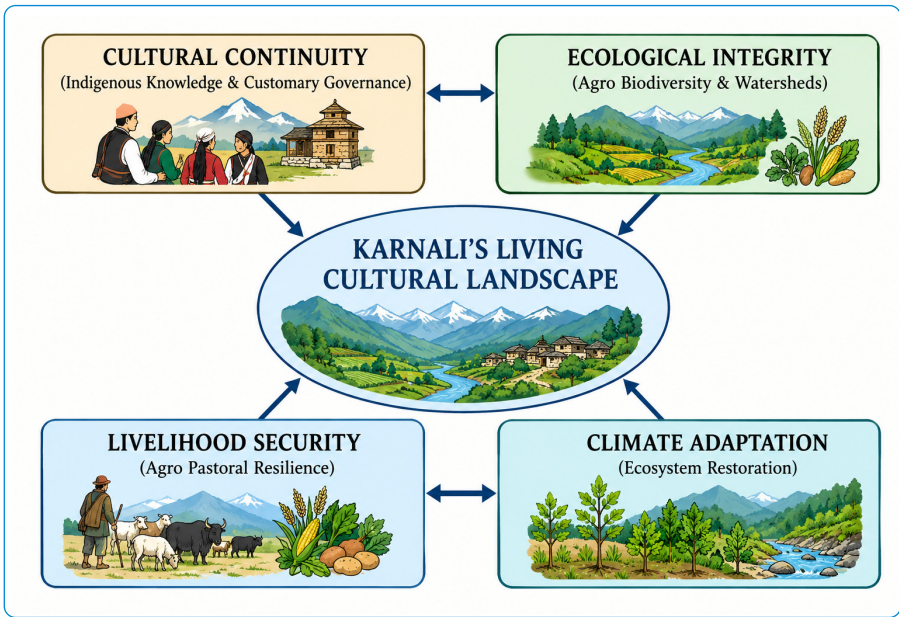


Table 2

Key Metrics and Analytical Indicators

Analytical Dimension	Core Focus Area	Empirical Metric / Target Indicator
Preservation	Intangible Cultural Heritage & Institutions	Greater than 80% intergenerational transmission of customary resource regulations and indigenous dialects.
Transformation	Socio-Economic & Climate Adaptation	Complete integration of community driven ecosystem restoration initiatives into rural municipal development plans.
Sustainability	Biodiversity & Livelihood Security	Collaborative management of local watersheds and agrobiodiversity to mitigate socioeconomic and market vulnerabilities.

Policy Synthesis and Strategic Imperatives

Institutional Recognition: Formally integrate traditional ecological knowledge (TEK) and

customary governance structures into provincial environmental policy frameworks.

Inclusive Governance

Ensure the active participation of indigenous communities in local land use planning and resource allocation decisions.

Holistic Policy Integration

Synthesize biodiversity conservation, climate change adaptation, and livelihood security into comprehensive regional development blueprints.

Within Karnali, environmental conservation does not constitute a discrete, formalized initiative; rather, it is inextricably integrated into daily subsistence routines, spiritual traditions, and collective labor mechanisms. Nevertheless, empirical observations highlight a significant vulnerability characterized by diminishing youth engagement and the degradation of intergenerational knowledge transfer. This trend indicates that regional landscape preservation remains highly susceptible to demographic transitions, the expansion of formal education systems, and evolving generational aspirations.

Consequently, preservation must not be construed as an endeavor to fix these landscapes in a static historical condition, but rather as a continuous, adaptive process. Long-term sustainability demands the reinforcement of local institutional capacity to transmit, modernize, and apply traditional ecological knowledge within contemporary socioeconomic realities.

The structural transformation of Karnali's indigenous cultural landscapes is propelled by an intricate matrix of internal and external drivers. Unplanned infrastructural development, youth outmigration, climate variability, and increasing market integration have profoundly modified traditional land use practices, settlement architectures, and customary resource governance. These developments present both distinct opportunities and systemic challenges. The central issue is not change itself, but the capacity of local communities to adapt in a manner that preserves core cultural values and ecological safeguards.

When modernization erodes indigenous institutions in the absence of viable alternatives, the overall resilience of the socio-ecological matrix is compromised (Folke, 2006).

Furthermore, indigenous populations in Karnali perceive sustainability as an integrated, multidimensional framework wherein ecological integrity is directly linked to cultural continuity, social cohesion, and economic security. This holistic paradigm aligns with international policy frameworks that increasingly acknowledge traditional ecological knowledge as a vital resource for biodiversity conservation, climate adaptation, and sustainable resource management (UNESCO, 2025, 2026).

Consequently, achieving long-term sustainability in Karnali necessitates a foundational policy paradigm shift: local communities must be engaged as active partners and co-managers of their regional landscapes rather than passive recipients of state directed interventions.

This analysis contributes to the broader discourse on sustainable mountain development by illustrating that indigenous cultural landscapes function as dynamic socio-ecological systems whose long-term resilience relies on preserving the interconnected relationships among communities, cultural traditions, and local environments. These findings challenge top down conservation models that artificially bifurcate human activity from natural ecosystems, advocating instead for collaborative governance frameworks that synthesize indigenous knowledge systems with empirical scientific research.

Amid an era characterized by accelerated climate disruption, demographic outmigration, and economic transition, the experience of Karnali demonstrates that sustainability is attained not by resisting transformation, but by enhancing the adaptive capacity of local institutions. This adaptive capacity empowers communities to navigate external pressures while safeguarding the

cultural values and ecological practices that sustain their collective identity and environment.

Ultimately, these high altitude landscapes extend far beyond regional significance, serving as globally valuable exemplars of sustainable human environment interactions. Their protection contributes directly to international objectives concerning biodiversity conservation, cultural preservation, climate resilience, and inclusive sustainable development.

Conclusion

The indigenous cultural landscapes of Karnali are most accurately conceptualized as dynamic socio-ecological systems rather than static heritage artifacts. Their long-term preservation relies on sustaining the intrinsic relationships linking human populations, territorial spaces, linguistic diversity, ecological vitality, subsistence practices, and customary institutions.

Empirical evidence demonstrates a tripartite dynamic. Preservation persists through linguistic heterogeneity, pastoralist traditions, customary governance frameworks, sacred geographies, and traditional knowledge repositories. Conversely, transformation accelerates via anthropogenic climate change, demographic migration, market integration, infrastructure expansion, shifting generational aspirations, and the decline of traditional subsistence strategies. Consequently, sustainability mandates an adaptive conservation model that synthesizes indigenous knowledge systems, empirical scientific research, inclusive development, and local community authority.

The critical policy imperative requires a fundamental transition from insulating culture against change to empowering communities to direct transformation on their own terms. The future cultural resilience of Karnali relies on ensuring that younger generations perceive traditional knowledge as entirely compatible with formal education, dignified employment, technological advancement, and modern citizenship. By integrating ecological

restoration, intergenerational knowledge transfer, and livelihood enhancement, Karnali exemplifies that indigenous knowledge serves not merely as an archive of historical precedent, but as a strategic resource for climate resilience and sustainable mountain development.

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