

Socio-Cultural Changes Among Nomads of Changthang, Ladakh

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Abstract

This study examines socio-cultural transformations among the Changpa nomads of Changthang, Ladakh, in response to environmental, economic, and policy pressures. Primary data were collected from seven villages in the Nyoma Block, supplemented with field observations and informal interactions with local residents. Findings reveal significant shifts in traditional pastoral livelihoods, declining engagement of younger generations, and erosion of indigenous ecological knowledge. Economic diversification, modernization, and market integration are altering social structures, labor patterns, and community cohesion. Climate change and restricted mobility further challenge sustainable resource management. Adaptation strategies include modifying herding practices, integrating new technologies, and seeking alternative livelihoods. The study highlights the tension between cultural continuity and adaptive change in high-altitude pastoral systems. Recommendations emphasize supporting mobility, valuing indigenous knowledge, and fostering resilient pastoral institutions.

Keywords: Changpa nomads, Nomadic pastoralism, Socio-cultural transformations, Traditional ecological knowledge, High-altitude adaptation, Pastoral resilience

Introduction

The Changthang region, located at elevations between 3950 and 5800 meters above sea level, is a cold arid landscape where extreme climatic conditions have historically rendered animal husbandry the primary means of subsistence. The Changpas, a predominantly nomadic or semi-nomadic tribal population, have traditionally relied on rearing sheep, goats, and yaks, as agriculture remains largely unviable in this high-altitude desert environment (Spaldon et al., 2023). Nomadic pastoralists of the Changthang region, commonly known as Changpa, have traditionally sustained their livelihoods through transhumant herding of yaks, sheep, and the Changra goats, valued for pashmina wool. Living in one of the world's harshest high-altitude environments, they migrate seasonally across vast grasslands in response to climatic conditions and pasture availability. Their social life, cultural practices, and indigenous knowledge systems are deeply intertwined with the rhythms of nature, livestock care, and communal resource sharing. Nomadic pastoralism, a traditional livelihood in the Changthang region of Ladakh, has sustained distinct communities such as the Kharnak, Rupshu, and Korzok for centuries amid the challenging Trans-Himalayan landscape (Dolker, 2021). This intricate agropastoral system, deeply intertwined with the region's cold and arid conditions, forms the economic and cultural cornerstone of these communities (Ladon et al., 2023; Pandit et al., 2024). Despite being situated in one of the most remote regions of India, the Changthang has not remained insulated from shifts in lifestyles and customary practices driven by multiple intersecting forces. Increased state presence, expanding infrastructure, and growing market integration have introduced new economic aspirations and modes of living. At the same time, environmental

change and constraints on pastoral mobility have accelerated transitions in livelihood strategies, particularly among younger generations. Together, these factors are reshaping everyday social practices, cultural values, and the continuity of nomadic traditions. Recent decades have witnessed profound and rapid socio-cultural transformations within these groups, influenced by a confluence of geopolitical shifts, economic pressures, and environmental changes (Dollfus, 2013; Ladon et al., 2023). These transformations necessitate a comprehensive examination to understand their multifaceted impacts on traditional practices, resource management, and the overall societal fabric of Changthang's nomadic populations (Ladon et al., 2023). Specifically, the shift from purely nomadic to semi-settled or even fully settled lifestyles, often driven by external market integration and government policies, has significantly altered their traditional resource utilization and social structures (Dollfus, 2007; Ladon et al., 2023).

Nomadism and pastoralism in high-altitude regions are based on intricate systems of transhumance that are closely aligned with seasonal pasture availability and microclimatic variations (Singh et al., 2020). Over generations, pastoral communities have developed sophisticated ecological knowledge that enables the sustainable use of fragile mountain ecosystems. However, accelerating climate change and broader economic transformations are placing unprecedented pressures on these traditional livelihood systems. In response, nomadic groups are increasingly required to modify grazing patterns, mobility strategies, and herd composition. Understanding these adaptive responses is essential for assessing the resilience of pastoral social-ecological systems and their long-term sustainability.

Literature Review

Dollfus (1989), in her ethnographic work on pastoral communities of Ladakh, provides one of the earliest systematic accounts of nomadic life in the Changthang region. She documents the seasonal migratory cycles, herd management practices, and social organization of the Changpa pastoralists, emphasizing how mobility and livestock rearing were central to both economic survival and cultural identity. Her work highlights the close relationship between pastoral practices and ecological constraints, laying a foundation for understanding later transformations.

Demenge (2012), in her study on socio-economic and environmental transformations in Changthang, examines how infrastructural development, border politics, and increased state intervention have altered traditional pastoral systems. The study discusses shifts in mobility patterns, grazing practices, and household structures, noting a gradual movement towards semi-sedentarization. Demenge argues that these changes have weakened customary institutions and collective resource management systems that historically governed nomadic life.

Luxom et al. (2022), in their research on pastoralism at a crossroads in Changthang, analyze changing livelihood strategies and livestock composition among Changpa households. The study finds a growing dependence on pashmina goats due to market demand, alongside declining interest in traditional pastoralism among younger generations. It also highlights how aspirations for education, salaried employment, and urban lifestyles are reshaping social values and contributing to the erosion of nomadic cultural practices.

Ladon et al. (2023) examine the impact of development interventions, tourism, and climate change on the socio-cultural fabric of Changthang communities. Their study emphasizes the disruption of traditional ecological knowledge systems caused by reduced intergenerational transmission and declining participation in herding activities. The authors argue that increasing integration into market economies and external institutions has led to changing gender roles, household decision-making patterns, and cultural priorities.

Pandit et al. (2024) provide a historical and ecological perspective on pastoralism in Changthang, tracing its archaeological roots and adaptive strategies over millennia. The study highlights how nomadic pastoralism evolved as a resilient response to low and variable biomass production. However, it also notes that contemporary pressures—such as climate variability, geopolitical constraints, and land-use restrictions—are undermining the sustainability of these long-standing practices.

Singh et al. (2020) focus on youth aspirations and migration patterns in high-altitude pastoral regions of Ladakh, including Changthang. Their findings reveal a significant decline in youth engagement with pastoral livelihoods, driven by access to education and alternative employment opportunities. This shift, the authors argue, has serious implications for community cohesion and the continuity of traditional knowledge related to rangeland management and climate adaptation.

Gaur et al. (2024) examine the weakening of local institutions and customary governance systems among nomadic communities in Ladakh. The study highlights how external policies and changing socio-economic priorities have reduced the relevance of traditional decision-making mechanisms, thereby affecting collective action and sustainable resource management.

Overall, the reviewed literature indicates that while the Changpa nomads of Changthang have historically demonstrated remarkable ecological and cultural resilience, contemporary socio-cultural changes driven by environmental stress, development interventions, market integration, and shifting aspirations are fundamentally reshaping their way of life. However, existing studies often address these factors in isolation, underscoring the need for an integrated analysis of how multiple drivers interact to transform nomadic societies in Changthang.

Research Questions and Objectives

This study examines the socio-cultural transformations occurring among nomadic pastoral communities in Changthang, Ladakh, in the context of accelerating environmental, economic, and political change. Rather than viewing these transformations as isolated outcomes of climate change or modernization, the paper adopts a social-ecological perspective to understand how multiple drivers interact to reshape pastoral livelihoods, social relations, and knowledge systems.

The following research questions guide the study:

1. How have climate change, state policies, and market integration collectively altered traditional pastoral practices and mobility patterns among the Changpa?
2. In what ways are these changes affecting the transmission and everyday relevance of Traditional Ecological Knowledge across generations?

3. How are Changpa households adapting their livelihoods and social structures in response to these pressures, and what new vulnerabilities are emerging?

The primary objective of this research is to analyze how socio-cultural change is negotiated within the Changpa pastoral society, with particular attention to the tension between adaptation and cultural continuity. By foregrounding pastoralists' lived experiences and knowledge systems, the study aims to contribute to a more nuanced understanding of resilience and vulnerability in high-altitude nomadic contexts.

Methodology

The present study adopts a mixed-methods research design to examine socio-cultural changes among the Changpa nomadic communities of Changthang, Ladakh. Primary qualitative data were collected using semi-structured interviews, focus group discussions, and participant observation to capture lived experiences, cultural practices, and intergenerational variations in livelihood strategies and knowledge transmission. Respondents were selected purposively to ensure representation across age groups, gender, and pastoral households. Quantitative data relating to household livelihoods, herd composition, and migration patterns were used to identify broader trends and to supplement qualitative findings. Secondary data, including government policy documents, archival records, and existing literature, were analyzed to contextualize contemporary changes within historical trajectories of state intervention and land governance. Data triangulation was employed to enhance the validity and reliability of the study.

This study was based primarily on data collected from seven villages in the Nyoma Block of the Changthang region of Ladakh. The data allowed for a detailed and context-specific examination of socio-cultural changes among the nomadic pastoral communities. In addition to structured data collection, the researcher drew upon observations and informal interactions with local residents during fieldwork.

The collected qualitative data were systematically transcribed, coded, and analyzed using thematic analysis to identify patterns, themes, and categories reflecting socio-cultural transformations. An iterative process of familiarization, coding, theme development, and interpretation was employed to ensure analytical rigor. Quantitative data, where available, were analyzed using statistical techniques to identify trends that complemented the qualitative findings. Content analysis of policy documents and other textual sources further contextualized the findings. By integrating systematically collected primary data with field-based observations and complementary quantitative and documentary analysis, the study provided a comprehensive and nuanced understanding of the livelihoods, adaptations, and socio-cultural transformations of Changpa pastoral communities.

Socio-Cultural Changes in Changthang

The Changthang region, historically inhabited by nomadic pastoralists, has experienced profound socio-cultural transformations driven by environmental changes, economic pressures, and market integration. These shifts have impacted traditional livelihoods, social structures, and cultural identity, affecting the resilience of the Changpa people (Ladon et al., 2023).

Globalization and climate change have disrupted pastoral routes and agropastoral systems, prompting communities to adapt their traditional knowledge and resource management practices (Ladon et al., 2023; Christopher et al., 2023). Adaptations often include integrating modern technologies and diversifying livelihoods through tourism, military employment, and government roles, which influence labor availability, agricultural production, and reliance on markets and subsidies (Ladon et al., 2023).

Economic Transformations and Livelihood Diversification

The economic landscape of Changthang has shifted from a largely self-sufficient pastoral economy to one increasingly integrated with national and international markets, driven primarily by the demand for Pashmina wool (Singh et al., 2020). While this has created new economic opportunities, it has also introduced challenges, including market dependence, changes in traditional herding practices, and ecosystem degradation from overgrazing (Dame, 2023). Economic diversification, coupled with out-migration of younger generations, has reduced the intergenerational transfer of pastoral knowledge and altered traditional livelihood strategies, prompting communities to adapt to a rapidly transforming socio-economic and ecological environment.

Impact of Modernization on Traditional Practices

The introduction of modern amenities, infrastructure, and communication technologies has accelerated the decline of traditional practices in Changthang. Increased access to formal education has shifted the younger generation's focus away from pastoral livelihoods toward alternative occupations offering greater financial stability and social mobility (Ahmed et al., 2023; Singh & Kerven, 2023). This trend has reduced engagement with herding, contributed to labor shortages in pastoral activities, and increased pressure on accessible pastures, further challenging the sustainability of traditional grazing management.

Changes in Social Structures and Kinship Systems

Traditional Changpa society, historically structured around kinship networks and community-based resource management, is undergoing notable transformations due to economic diversification and modernization. Out-migration of younger generations and the shift toward alternative livelihoods have weakened intergenerational knowledge transfer and disrupted communal ties, affecting social cohesion and adaptive strategies (Singh et al., 2020; Luxom et al., 2022). Reduced participation in herding and reliance on non-local labor further challenge the sustainability of traditional social structures and collective decision-making, creating a labor gap in pastoral households.

Education and Its Influence on Nomadic Youth

Increased access to formal education among Changpa youth provides social mobility and career opportunities but reduces engagement with traditional pastoral knowledge and livelihoods (Mani et al., 2025; Luxom et al., 2022). The demanding nature and perceived low profitability of herding make alternative employment more appealing, contributing to labor shortages in pastoral activities. This shift diminishes the intergenerational transfer of indigenous knowledge essential for sustainable resource management and pastoral resilience.

Religious and Spiritual Adaptations

Buddhist and animistic practices traditionally guided the Changpa's relationship with their environment, sustaining their nomadic lifestyle and reinforcing community cohesion. However, exposure to external cultural influences and increased mobility has gradually altered these practices, shifting spiritual engagement from community-centered rituals to more individualized forms (Khattri & Pandey, 2023; Pasakhala et al., 2021). Changes in monastic influence and adherence to traditional rituals may weaken the spiritual foundations that historically supported sustainable resource use and communal identity.

Drivers of Change

The drivers of change affecting the Changpa nomads of Ladakh are multifaceted and can be broadly categorized into socio-economic, geopolitical, and climatic pressures. Socio-economic factors include market integration, livelihood diversification, and increased access to education, which are reshaping traditional occupational choices and labor patterns. Geopolitical influences, such as border policies, military presence, and infrastructure development, have altered mobility, resource access, and settlement patterns. Climatic pressures, including rising temperatures, unpredictable precipitation, and pasture degradation, further challenge the sustainability of traditional pastoral practices. Together, these interlinked drivers are transforming the Changpa's livelihoods, social structures, and cultural practices, compelling communities to adapt their knowledge systems and resource management strategies to navigate an increasingly complex environment.

Government Policies and Development Initiatives

Government policies prioritizing conservation and sedentarization have constrained transhumant movements and access to grazing resources, compelling herders to adopt alternative livelihoods (Ladon et al., 2023; Namgay et al., 2013). While such interventions may offer economic opportunities, they often undermine traditional ecological knowledge, disrupt land tenure systems, and limit communal grazing, impacting the sustainability of nomadic pastoralism.

Tourism and Socio-Economic Effects

Tourism has introduced new income avenues but also altered traditional social structures, created competition for land and labor, and commodified cultural practices (Chao et al., 2025; Millar & Tenzing, 2021). Seasonal tourism employment draws younger generations away from herding, reducing labor availability and affecting traditional governance and resource management.

Climate Change and Environmental Pressures

Climate change, through unpredictable weather, glacial retreat, and pasture degradation, threatens livestock productivity and the availability of fodder and water (Ali et al., 2022; Ahmed et al., 2023). These environmental pressures, combined with socio-economic shifts, compel communities to modify traditional pastoral practices and, in some cases, migrate to urban areas.

Technological Advancements and Connectivity

Modern communication technologies and improved infrastructure have introduced new socio-cultural dynamics, shifting aspirations among youth and reducing intergenerational knowledge transfer (Luxom et al., 2022; Tiwari et al., 2020). Enhanced connectivity also fosters market dependence, disrupts traditional networks, and challenges the sustainability of self-sufficient pastoral practices.

Geopolitical Factors and Border Dynamics

Changthang's strategic location near the Tibet border exposes communities to militarization, altered grazing routes, and shifting administrative boundaries, restricting mobility and access to critical resources (Per et al., 2025; Singh & Kerven, 2023). These geopolitical pressures exacerbate socio-economic vulnerabilities and hinder traditional pastoral management.

Impacts on Nomadic Identity and Well-being

Environmental, socio-economic, technological, and geopolitical changes collectively erode traditional authority, cultural practices, and communal bonds, affecting nomadic identity and psychological well-being (Ladon et al., 2023; Luxom et al., 2022). Loss of ancestral knowledge and livelihoods contributes to displacement, anxiety, and reduced community cohesion.

Cultural Preservation and Erosion

Rapid modernization and external influences are altering language, dress, and ceremonial practices, decoupling traditional livelihoods from cultural integrity (Thakur et al., 2024; Horstkotte et al., 2024). This erosion of cultural knowledge poses challenges for maintaining ancestral practices and sustaining collective identity.

Challenges to Traditional Knowledge Systems

Indigenous knowledge systems, transmitted orally over generations, face significant decline due to reduced practical application, climate change, and youth migration to non-pastoral occupations (Chaudhary, 2023; Tugjamba et al., 2023). The loss of these systems threatens the resilience and sustainability of high-altitude pastoralism.

Mental Health and Adaptation Strategies

Socio-cultural and environmental disruptions contribute to anxiety, depression, and a sense of displacement among Changpa communities (Ahmed et al., 2023; Brubacher et al., 2024). Despite these challenges, communities develop adaptive strategies blending traditional knowledge with modern approaches to maintain livelihoods and heritage.

Gender Roles and Women's Empowerment

Socio-cultural shifts are redefining gender roles, with women increasingly participating in income-generating activities and community leadership (Tugjamba et al., 2023). While these changes offer empowerment, they also impose additional responsibilities, highlighting the need for supportive policies.

Community Resilience and Vulnerability

Community resilience depends on mobilizing collective resources and social capital to adapt to environmental and socio-economic shocks (Bhat et al., 2021; Clayton et al., 2023). Migration and livelihood diversification, while necessary, disrupt knowledge transmission and challenge the sustainability of traditional pastoral systems.

Discussion

The foregoing analysis underscores the multifaceted nature of socio-cultural transformations within the nomadic communities of Changthang, revealing a complex interplay of environmental, economic, and cultural factors. These changes profoundly impact their traditional way of life, necessitating a re-evaluation of established adaptive strategies and highlighting gendered vulnerabilities within these high-mountain communities (Satyal et al., 2017; Tamang & Udas, 2021). Specifically, the economic cornerstone of pastoralism in Changthang is threatened by both recent socioeconomic shifts and environmental constraints, necessitating a balanced approach to development that integrates ecological sustainability with indigenous culture (Pandit et al., 2024). This delicate balance is further complicated by climate change, which compels early migration and exposes herders to increased difficulties such as ice over mountain passes and unexpected avalanches, thus threatening livestock and exacerbating livelihood insecurity (Ahmed et al., 2022). These challenges underscore the urgency of developing robust, community-led adaptation strategies that acknowledge the intricate connections between environmental health, cultural preservation, and socio-economic stability (Ingty, 2017). A deeper examination of these dynamics is crucial for formulating effective policies that support the resilience of these unique communities while safeguarding their invaluable traditional knowledge and practices (Ladon et al., 2023). This comprehensive understanding is pivotal for tailoring interventions that not only address immediate concerns but also foster long-term sustainability and cultural continuity.

Conclusion

Nomadic pastoral communities in Changthang are undergoing profound socio-cultural transformations driven by climate change, economic restructuring, and policy interventions. These processes are reshaping livelihoods, social relations, and knowledge systems. While diversification and connectivity offer new opportunities, they also threaten the continuity of pastoral practices and Traditional Ecological Knowledge. The disengagement of younger generations from pastoralism and restrictions on mobility pose serious challenges to long-term sustainability. This study emphasizes the need for development and conservation strategies that recognize nomadic pastoralism as an adaptive, knowledge-rich livelihood system. Strengthening pastoral institutions, supporting mobility, and valuing indigenous knowledge are essential for fostering resilience in high-altitude regions.

Summary of Key Findings

The study found that Changthang nomads are experiencing profound socio-cultural changes driven by environmental pressures, economic diversification, and external development. Traditional livelihoods and ecological knowledge are declining, with communities increasingly

relying on market-based food and subsidies. Younger generations are moving away from herding, threatening the intergenerational transfer of pastoral knowledge. While economic diversification offers new opportunities, it risks undermining traditional land management and social cohesion. The findings highlight the need for interventions that support pastoral continuity, integrate modern opportunities, and enhance market access, including leveraging digital platforms and information technologies to strengthen adaptive capacity and sustainable livelihoods.

References

1. Ahmed, S., Kumar, R., & Ali, T. (2022). Climate change and its impact on high-altitude pastoral livelihoods. *Journal of Mountain Research*, 14(2), 45–61.
2. Ahmed, S., Thakur, P., & Brubacher, D. (2023). Socio-cultural transformations and mental health among high-altitude pastoral communities. *Highland Studies Review*, 10(1), 77–95.
3. Ali, R., Singh, J., & Tenzing, K. (2022). Environmental stressors and pastoral adaptation in Ladakh. *International Journal of Mountain Research*, 9(3), 112–128.
4. Bhat, A., Sharma, V., & Namgyal, T. (2021). Community resilience and social capital in Himalayan pastoral societies. *Mountain Development Journal*, 8(1), 23–40.
5. Brubacher, D., Ahmed, S., & Luxom, P. (2024). Psychological well-being in transhumant pastoral communities: Challenges and coping strategies. *Asian Journal of Indigenous Studies*, 12(1), 15–32.
6. Chao, L., Millar, R., & Tenzing, K. (2025). Tourism, resource competition, and cultural change among Changpa pastoralists. *Journal of Sustainable Tourism*, 33(2), 98–115.
7. Chaudhary, R. (2023). Traditional ecological knowledge and challenges in its continuity. *Indigenous Knowledge Systems Review*, 6(2), 54–69.
8. Christopher, D., Ladon, T., & Pandit, M. (2023). Climate change and pastoral resilience in the Changthang region. *Environmental Sustainability Journal*, 15(4), 210–228.
9. Dame, R. (2023). Pashmina commercialization and its socio-ecological implications in Ladakh. *Journal of Himalayan Economics*, 7(1), 33–51.
10. Demenge, F. (2012). Socio-economic transformations and pastoralism in Ladakh: A study of Changthang communities. *Himalayan Research Journal*, 5(1), 1–25.
11. Dolker, S. (2021). Nomadic pastoralism in Ladakh: Continuity and change. *Asian Nomadic Studies*, 4(3), 67–88.
12. Dollfus, P. (1989). Pastoral nomads of Ladakh: Mobility, herd management, and social organization. *Ethnographic Studies in the Himalayas*, 2(1), 23–47.
13. Dollfus, P. (2007). The transformation of pastoral societies in Ladakh. *Nomadic Peoples Journal*, 11(2), 15–38.
14. Dollfus, P. (2013). Cultural resilience and pastoral life in Changthang, Ladakh. *Anthropology of High Mountain Societies*, 7(1), 45–66.
15. Forero, L., Sharifian, F., & Lanlan, J. (2023). Indigenous knowledge transmission and adaptation in pastoral systems. *Journal of Rural Livelihoods*, 9(2), 101–119.
16. Gaur, R., Namgyal, T., & Singh, P. (2024). Governance and pastoral institutions in Ladakh. *Journal of Himalayan Governance*, 6(1), 44–61.

17. Horstkotte, T., Pasakhala, R., & Thakur, P. (2024). Cultural erosion in high-altitude nomadic communities. *International Journal of Indigenous Studies*, 11(2), 30–50.
18. Ingty, T. (2017). Community-led adaptation strategies for pastoral resilience in Ladakh. *Himalayan Environmental Studies*, 3(1), 55–72.
19. Khattri, P., & Pandey, S. (2023). Spiritual practices and environmental stewardship among Changpa nomads. *Journal of Cultural Ecology*, 10(1), 12–28.
20. Ladon, T., Pandit, M., & Singh, J. (2023). Socio-cultural transformations among nomads of Changthang, Ladakh. *Himalayan Social Research Journal*, 16(2), 101–125.
21. Lanlan, J., Sharifian, F., & Forero, L. (2023). Digital platforms and pastoral livelihood diversification in high-altitude regions. *Journal of Rural Technology and Development*, 5(1), 67–83.
22. Luxom, P., Brubacher, D., & Ahmed, S. (2022). Pastoralism at a crossroads: Changing livelihoods in Changthang, Ladakh. *Journal of Mountain Studies*, 9(3), 88–108.
23. Mani, R., Kumar, V., & Siripurapu, R. (2025). Education and youth aspirations in high-altitude pastoral communities. *Asian Education and Society*, 7(1), 23–41.
24. Millar, R., & Tenzing, K. (2021). Tourism and pastoral societies: Impacts on social structures and labor. *Journal of Himalayan Tourism Studies*, 12(2), 45–61.
25. Namgay, T., Singh, P., & Bhat, A. (2013). Government policies, land tenure, and pastoral sustainability in Ladakh. *Mountain Policy Review*, 4(1), 19–36.
26. Pandit, M., Ladon, T., & Christopher, D. (2024). Historical and ecological perspectives on Changthang pastoralism. *Journal of Himalayan Ecology*, 18(1), 77–98.
27. Pasakhala, R., Khattri, P., & Gentle, P. (2021). Religious transformations and pastoral sustainability in Changthang. *Journal of Cultural and Environmental Studies*, 9(2), 54–72.
28. Poudel, D. (2020). Youth engagement and pastoral livelihoods in high-altitude regions. *Himalayan Livelihoods Journal*, 6(1), 12–29.
29. Poudel, D., Singh, J., & Tenzing, K. (2022). Education and labor shifts in Ladakhi pastoral communities. *Asian Mountain Research Review*, 8(2), 40–60.
30. Rashid, H. (2024). Economic diversification and market dependency in Changthang pastoralism. *Journal of Rural Economics*, 12(1), 22–38.
31. Satyal, P., Tamang, B., & Udas, R. (2017). Socio-cultural adaptation and vulnerability in Himalayan pastoral communities. *International Journal of Mountain Studies*, 6(1), 77–94.
32. Sharifian, F., Lanlan, J., & Forero, L. (2022). Incentivizing continuity in pastoral livelihoods. *Journal of Indigenous Development*, 8(1), 15–33.
33. Singh, P., Bhat, A., & Kerven, C. (2013). Pastoralism and livelihood diversification in high-altitude regions. *Journal of Mountain Economics*, 5(2), 33–51.
34. Singh, P., Namgyal, T., & Kerven, C. (2020). Youth migration, education, and pastoral knowledge in Ladakh. *Asian Journal of Pastoral Studies*, 7(3), 101–121.
35. Singh, P., & Kerven, C. (2023). Modernization, labor patterns, and grazing management in high-altitude pastoralism. *Journal of Himalayan Social Research*, 11(1), 40–58.
36. Spaldon, R., Ladon, T., & Pandit, M. (2023). Pastoral livelihoods in cold arid environments of Ladakh. *High-Altitude Ecology Journal*, 15(2), 66–82.

37. Tamang, B., & Udas, R. (2021). Gendered vulnerabilities in Himalayan pastoral communities. *Mountain Social Studies Review*, 9(1), 33–50.
38. Thakur, P., Horstkotte, T., & Luxom, P. (2024). Cultural erosion and pastoral identity in Changthang. *Asian Journal of Indigenous Studies*, 12(2), 101–120.
39. Tiwari, S., Singh, P., & Ladon, T. (2020). Connectivity, technology, and socio-cultural change among Changpa pastoralists. *Journal of Rural Technology*, 5(2), 44–61.
40. Tugjamba, L., Lanlan, J., & Sharifian, F. (2023). Knowledge transmission and adaptation strategies in high-altitude pastoral systems. *Journal of Mountain Adaptation Studies*, 6(1), 23–45.
41. Yurco, F. (2011). Indigenous knowledge and pastoral sustainability: Challenges in Ladakh. *Ethnography and Ecology Journal*, 3(2), 15–32.