

Survival and Sustainability: Indigenous Knowledge and Skills of the Musahar Community in Nepal

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Abstract

The Musahar community, one of the most underserved indigenous groups in Nepal, possesses a rich knowledge and skill base that has enabled them to thrive and sustain themselves. This research paper explores the traditional livelihoods, local knowledge systems, and skills of the Musahar community. It highlights their deep understanding of the planet's ecosystems, their sustainable resource management practices, and their resilience in the face of environmental disasters and climate change. The paper examines the relationship between the Musahar community and the shifts brought about by modern living, including the decline of knowledge from older generations, challenges in accessing formal education, and government policies that hinder traditional employment opportunities. The findings suggest that integrating the community's native expertise into schools, securing land and property rights, and providing skill training programs can promote sustainable development. The research presents recommendations for enhancing the Musahars' living standards while preserving their cultural practices.

Keywords: Musahar, indigenous, traditional knowledge, cultural practices

Introduction

Indigenous knowledge and skills have played a vital role not only in the survival but also in the sustainability of marginalized communities. In the context of Nepal, the Musahar community serves as a prominent example. As one of the most marginalized and historically "untouchable" groups in Nepal, the Musahar people have long relied on their indigenous knowledge systems for social survival. Traditionally, they have engaged in occupations such as agriculture, fishing, and foraging. The purpose of this research, therefore, is to explore how the Musahar community's indigenous knowledge and skills contribute to their environmentally sustainable way of life.

The Musahar people, primarily found in Nepal's Terai region, are among the country's most economically disadvantaged communities. They have historically endured severe social exclusion, financial hardship, and educational marginalization and are recognized as a Dalit sub-caste (Gautam, 2020a; Giri, 2025). Traditionally landless, the Musahars depended on hunting, fishing, and manual agricultural labor to sustain themselves. The term "Musahar," meaning "rat eaters" in Nepali, originates from their roots as forest dwellers known for their skill in catching rats—a significant food source in earlier times (Sharma, 2017a).

Despite constitutional guarantees of their rights, the Musahars continue to face extreme poverty, systemic discrimination, and limited access to formal education. Their indigenous skills—such as traditional fishing methods, water conservation techniques, and the use of medicinal plants—are vital to their survival, yet remain largely overlooked in academic discourse.

Indigenous knowledge refers to the traditional knowledge, practices, and skills that local communities have developed over generations in response to their social and environmental conditions (Agrawal, 1995). The Musahar people rely heavily on such knowledge to sustain their livelihoods, manage natural resources, and protect biodiversity.

It is significant that they have indigenous knowledge about food security and resource usage. The Musahars have learned a great deal about sustainable fishing methods, trapping techniques, and edible wild plants to cope with food scarcity (Chhetri & Smith, 2019a). For instance, they gather and eat leafy greens like *Amaranthus viridis* and wild tubers like *Dioscorea bulbifera* (air potato). These plants are commonly sun-dried and saved for use during lean seasons. In order to maintain sustainability, they also use hand-woven traps and time harvests to coincide with seasonal fish migrations. Furthermore, their traditional ecological knowledge (TEK) incorporates water harvesting and natural disaster resilience measures because of the Terai region's vulnerability to floods and droughts (Tamang & Dahal, 2021a).

Indigenous knowledge is also essential to environmental sustainability. As part of their sustainable farming methods, the people employ organic fertilizers and indigenous seed types that are climate change resilient (Poudel et al., 2022b). However, industrialization and industrial agriculture are replacing many of these sustainable

methods with market-driven alternatives that may not be long-term ecologically sustainable. Recognizing and integrating indigenous knowledge of the Musahar people into national policies on agriculture, conservation, and climate adaptation may be beneficial for community development as well as the broader sustainable development goals (SDGs).

Purpose and Scope

This paper aims to explore and document the traditional knowledge and survival practices of the Musahar people in Nepal, with a focus on their significance in sustainable living. In order to demonstrate how these practices aid in resource management and environmental preservation, the research examines the traditions and knowledge that have been passed down over the millennia. By analyzing the unique ways that the Musahar community interacts with their surroundings, this research seeks to shed light on the invaluable contributions that they make to sustainability.

One of the primary objectives of this study is to identify and assess the traditional survival techniques employed by the Musahar group. These include agricultural practices that have enabled them to sustain their livelihoods in sometimes challenging areas, water conservation strategies, and food security measures. By documenting these approaches, the research hopes to clarify their effectiveness and relevance in the present sustainability discussions. In the areas of resource management, environmental preservation, and climate adaptation, the study also examines how indigenous knowledge may promote sustainability. The Musahar community's deep understanding of their ecology and ability to adapt to shifting circumstances can teach us about resilience and sustainable living. Larger efforts for ecological balance and climate action can be substantially aided by acknowledging and preserving this information.

The sociopolitical barriers that hinder the recognition and preservation of Musahar indigenous knowledge are also examined in this study, along with their traditional knowledge. Despite its rich cultural heritage, the group is often marginalized and underrepresented in policy-making processes. These issues must be resolved to guarantee that their contributions to sustainability are acknowledged and included into mainstream development programs.

The study concludes by offering policy recommendations that support the incorporation of indigenous knowledge into national and regional sustainability programs. This study intends to bridge the gap between modern sustainability frameworks and indigenous practices by advocating for policies that recognize and incorporate the traditional knowledge of the Musahar community, fostering a more thorough and inclusive approach to environmental stewardship.

Historical and Socio-Cultural Background of the Musahars

In Nepal, the Musahar group has a long history of marginalization and social difficulties. Historically, the Musahars have relied on physical labor and traditional survival methods, making them one of the most disadvantaged Dalit tribes. Their historical, social, and vocational structures have been influenced by a severe caste system, economic marginalization, and limited access to resources. The history, origins, traditional vocations, social structure, and sociopolitical challenges of the Musahar group in contemporary Nepal are all covered in this section.

The indigenous Dalit group known as the Musahar lives in the Terai area of Nepal and the neighboring Indian states of Bihar and Uttar Pradesh. They have historically used hunting and eating rats as a survival strategy since they were shut out of normal economic activity and lived in abject poverty. The terms "musa" (rat) and "ahar" (meal) are the roots of the name "Musahar" (Sharma, 2017a). Because of their connection to rat-catching, they are the object of pervasive prejudice and societal stigmatization.

The Musahars are said to be derived from forest-dwelling tribes who were subsequently forced into bonded labor by feudal landowners during the Rana and Shah periods in Nepal (Gautam, 2020b). They were referred to as "untouchables" and excluded from land, education, and social mobility since they were the lowest caste in the system. They were usually used as landless laborers by landowners and depended on exploitative agricultural practices.

Throughout the 19th and 20th centuries, Nepal's sociopolitical framework served to further solidify its subjection. The land reform measures of the 1960s, which mostly favored upper-caste elites, left the Musahars economically insecure and without land (Tamang & Dahal, 2021b). The social structure of the Musahar society is very collectivist, with extended families living in small communities known as toles, or

townships. In contrast to the hierarchical systems found in many other caste groups, the Musahars operate within a rather egalitarian community system where members share work and survival chores (Poudel et al., 2022b).

The majority of Musahars are landless agricultural workers who do plowing, planting, and harvesting tasks for landlords and wealthy farmers (Chhetri & Smith, 2019 b). They often face financial hardships and employment uncertainty as a result of their dependence on seasonal agricultural work. Historically, Musahars have used rat hunting as an informal employment and a source of sustenance. They developed specific techniques to capture rats in rice fields, which helped farmers manage pest numbers indirectly (Sharma, 2017b). Many Musahars fish and collect edible aquatic plants since they often live near marshes and rivers. It is still a vital survival ability that has been passed down through the generations (Tamang & Dahal, 2021a). In recent years, economic constraints have forced Musahar men and women to work as migratory workers, in brick kilns, and in the construction sector, sometimes in low-wage, exploitative positions with poor working conditions (Gautam, 2020c).

Some Musahar households make handicrafts including baskets, mats, and other household items by weaving bamboo. The commercialization of these crafts remains limited due to a lack of funding and market access (Poudel et al., 2022c). Despite these traditional activities, urbanization, relocation, and the loss of indigenous territory have adversely affected their ability to sustain themselves through traditional means.

Research Methods

This article is developed based on ethnographic research conducted under the broader study titled "Schooling and Education of Minorities: Case of Musahars." The research employed qualitative methods, primarily interviews and observation, to explore the indigenous knowledge, survival strategies, and educational experiences of the Musahar community in Nepal. Participants included adult members of the Musahar community, both male and female, as well as school teachers and students from schools situated within or near Musahar settlements. These diverse perspectives allowed for a comprehensive understanding of the community's traditional skills and educational challenges. In addition to primary data, relevant literature was reviewed and integrated throughout the article to contextualize findings, support interpretations, and deepen the

analysis of the Musahars' cultural practices and sustainability strategies. In the following section, thematic findings are explored and discussed.

Results and Discussion

Challenges Faced by Musahars in Nepal's Socio-Political Landscape

Despite constitutional promises of equality and inclusion, the Musahar group continues to face institutional discrimination, economic suffering, and political underrepresentation. Their challenges are rooted in Nepal's caste-based system and social framework. One of the biggest problems the Musahars face is landlessness. They have historically been excluded from land ownership and still depend on landlords for employment, sometimes laboring under abusive conditions. Nepal's land reform programs have not included them in land ownership plans (Gautam, 2020d). On public or unclaimed property, many Musahars live in continual fear of being forced from their makeshift dwellings.

One of the biggest barriers to the Musahar community's upward mobility is their restricted access to education. One of the primary reasons for this issue is extreme poverty, which keeps many Musahar children from obtaining a formal education and drives them to work from an early age. Additionally, the issue is exacerbated by prejudice in schools, since Musahar kids are often socially excluded by both instructors and peers, making the classroom an unwelcoming environment for learning (Sharma, 2017c). A major contributing reason to poor educational achievement is parents' lack of understanding of the importance of education. This is partly due to generations of marginalization that have hindered their access to knowledge and chances for academic progress (Chhetri & Smith, 2019a). Thus, a cycle of educational poverty is perpetuated by these associated problems.

The Musahars are underrepresented in politics both nationally and locally. Upper-caste elites have traditionally controlled Nepal's government systems, and political parties have typically ignored the demands of Musahar groups (Tamang & Dahal, 2021a). As a result, measures that may lessen their marginalization, such as land redistribution and economic empowerment programs, are seldom implemented effectively.

Caste-based discrimination is still widespread in society and significantly affects the Musahar minority, despite Nepal's 2015 Constitution declaring it to be a secular and

caste-free republic. Their ongoing exclusion from a range of public spaces and social events, including temples and neighborhood get-togethers, serves to further solidify their marginalization. Furthermore, when Musahars attempt to access essential services like banking and healthcare, where prejudice is evident, they are often subjected to systematic bias and unjust treatment (Poudel et al., 2022c). Furthermore, there is still a lot of resistance to intercaste marriages, including Musahars, which limits their opportunities for social mobility and acceptability and makes social integration a constant struggle. These persistent barriers, which are a manifestation of the widespread nature of caste-based discrimination, make it difficult for the Musahar minority to achieve full social inclusion despite legislative safeguards.

Because they are primarily landless and reside in low-lying, flood-prone locations, the Musahars are particularly vulnerable to climate change and natural catastrophes (Chhetri & Smith, 2019a). Floods and droughts frequently destroy their houses and impair their livelihoods, forcing people to travel in quest of alternative work prospects. However, Nepal's climate adaptation programs seldom consider indigenous knowledge systems, further marginalizing them.

Thus, the historical and cultural foundation of the Musahar group reflects a heritage of marginalization, resilience, and traditional survival tactics. Despite systemic problems, the Musahars have maintained their vast knowledge of traditional professions, environmental adaptation, and communal resilience. By recognizing and integrating their indigenous knowledge into educational programs, legislative frameworks, and sustainable development projects, the cycle of poverty and exclusion must be overcome. Future research should look at how Musahar communities can be empowered through political inclusion, employment training, and land rights.

Indigenous Knowledge Systems and their Role in Survival

Indigenous knowledge systems are crucial to the survival and prosperity of disadvantaged people like the Musahar. Community-based activities, environmental consciousness, and long-standing traditions are examples of these knowledge systems. Because they are excluded from mainstream socioeconomic prospects, the Musahar have historically relied heavily on their indigenous knowledge to support themselves. This section looks at the ecological knowledge, traditional livelihoods, and health practices of the indigenous people, all of which contribute to their survival.

The indigenous knowledge systems of the Musahar group are the foundation of their subsistence-based occupations. These behaviors are essential to their existence even though they are becoming less common due to industrialization and environmental damage. The Musahar group has traditionally relied on subsistence farming and sharecropping since they are largely landless and cultivate the lands of upper-caste landowners. Their agricultural operations focus on staple crops like as rice, maize, millet, and lentils, using farming practices adapted to the local soil characteristics and climate (Sharma, 2017b). Despite having limited access to resources, the Musahars have developed and maintained traditional farming practices that promote sustainable farming. Instead of using chemical fertilizers, they mostly employ organic compost and manure to maintain soil fertility and environmental protection.

They also employ multi-cropping strategies to boost the output of their limited landholdings. In flood-prone areas, they have used flood-resilient rice production methods to minimize crop loss and maintain food security (Poudel et al., 2022a). These traditions not only preserve their way of life but also show their resilience in the face of environmental hardship and their enduring ecological expertise. Because they lack access to government subsidies, financial facilities, and irrigation, Musahars, despite their competence as farmers, are unable to fully benefit from modern agricultural advancements due to social and economic restrictions.

Fishing is the primary and secondary source of food and money for the Musahars, as many of them reside near rivers and marshes. They have continued to use traditional fishing techniques that are environmentally friendly in order to guarantee sustainability and efficiency. Because they yield a steady harvest with minimal resource expenditure, hand-net and bamboo trap fishing are two of these methods that are commonly used in shallow seas. They also utilize herbal fish attractants and spearfish to boost their production without harming aquatic habitats. Importantly, they fish using sustainable harvesting practices that preserve ecological balance and long-term food security while allowing fish populations to recover (Tamang & Dahal, 2021c). The Musahar community's profound awareness of their natural environment and dedication to preserving environmental harmony are reflected in these traditional practices.

Since generations of people have learnt about sustainable harvesting practices and seasonal fish migratory patterns, fishing has a significant cultural influence in

addition to ensuring food security. However, increased pollution, overfishing, and restricted access to aquatic bodies have put this livelihood in danger.

Foraging, which involves collecting edible wild plants, mushrooms, tubers, and medicinal herbs from fields and forests, has long been a skill of the Musahar people. This method has significantly improved food security, particularly during periods of scarcity (Gautam, 2020b). In addition to foraging, rat hunting—which uses specific methods that have been handed down through the generations—has long been an important survival tactic for the Musahars. These techniques include digging tunnels, employing trained dogs to locate nests, smoking out rats with dried leaves and twigs, and setting conventional bamboo and rope traps. These initiatives show the community's resourcefulness and adaptability in preserving their quality of life despite economic and environmental challenges. Even though this practice has declined due to changing food habits and economic shifts, it nevertheless represents indigenous survival knowledge.

For many centuries, Musahars have been able to effectively manage land and water resources due to their deep understanding of local ecosystems. Their knowledge system, which integrates seasonal cycles, flood control tactics, and soil conservation techniques, guarantees long-term sustainability.

Because their settlements are located in flood-prone locations, the Musahar people have developed indigenous ways to adapt to and mitigate the consequences of periodical floods. Building elevated mud dwellings, which provide safer living conditions and lessen the risk of flood damage, is one of their primary tactics. In order to reduce the likelihood of crop devastation, they also build small irrigation channels and erect temporary dikes to divert floodwater away from their houses and crops. To ease water shortages during the dry season, they use traditional rainwater gathering techniques, conserving water in clay pots and bamboo troughs for essential home and agricultural uses (Chhetri & Smith, 2019b). These adaptive behaviors demonstrate the Musahar community's tenacity in navigating natural perils and their deep understanding of their environment. Although they understand how to adapt to floods, the consequences of climate change have made them more vulnerable to extreme weather, which calls for additional support and infrastructure.

Due to their limited land holdings, Musahars employ low-input sustainable agricultural practices to protect their soil and land. These techniques aim to minimize soil deterioration and increase productivity from limited landholdings. They often employ crop rotation and intercropping techniques to maintain soil fertility and ensure balanced nutrient utilization. They employ environmentally friendly, natural insecticides made from plants, such as neem leaves, to keep pests away from their crops. Additionally, Musahars employ limited tillage methods, which reduce soil erosion and maintain essential soil moisture, hence promoting long-term soil sustainability and health (Tamang & Dahal, 2021a). Despite the fact that these techniques increase soil production and protect biodiversity, their wider application is constrained by their official lack of support and integration into modern agricultural strategies.

The Musahar community skillfully uses their extensive traditional ecological knowledge of the area's woodlands and wildlife for their daily survival and subsistence. They are able to identify a wide variety of edible and medicinal plants that are found in woods and grasslands and are utilized for both nutritional and therapeutic purposes due to their deep understanding of the natural world. The extensive use of bamboo and thatch in handicrafts and house construction demonstrates their sustainable use of natural resources. Furthermore, the Musahars are able to coexist peacefully with the ecosystem and avoid conflicts with other animals due to their keen understanding of wildlife behavior (Poudel et al., 2022a). However, their capacity to use these age-old skills has been curtailed by urbanization, deforestation, and conservation policies that restrict access to forests.

Traditional Skills and Occupational Expertise among Musahars in Nepal

The Musahar group in Nepal has established a wide range of traditional skills and vocational expertise that have been passed down through the centuries. Their survival strategies, cultural identity, and economic activities are all strongly tied to these skills. Despite their historical marginalization and social isolation, the Musahars have preserved and adapted these talents to sustain themselves. This part looks at their capabilities in subsistence farming, hunting, and fishing; handicrafts, bamboo work, and labor-related abilities; oral traditions, storytelling, and cultural manifestations. The Musahars have always relied on their long-standing knowledge of small-scale farming,

fishing, and hunting to live. These skills are shaped by their in-depth understanding of the local environment, seasonal fluctuations, and resource availability.

The Musahar people have a long history of fishing, and they have created and preserved several fishing techniques over the years, especially in the riverine and wetland regions of the Terai. Among their methods are hand-net fishing, which employs finely woven nets to capture fish in shallow waterways, and bamboo trap fishing, in which they skillfully construct cylinder traps out of bamboo to catch fish in ponds and streams. In deeper seas, they practice spearfishing with handmade spears. The Musahars also employ herbal fish attractants, which entail crushing plants containing naturally occurring toxins, such as *Datura stramonium*, to momentarily shock fish in order to facilitate fish collection (Tamang & Dahal, 2021d).

Fishing not only produces food but also generates extra income. However, increasing pollution, declining fish populations, and limits on access to water bodies due to privatization have significantly affected their fishing practices (Poudel et al., 2022b). One well-known aspect of the Musahar group is their distinctive traditional skill of rodent hunting, which has historical and cultural value.

Their name, "Musahar," literally means "rat-eater" in various area languages, indicating their longtime expertise in this profession. Their techniques include burrow traps, which involves digging into rat tunnels and employing trained canines to locate nests, and smoke extraction, which involves burning dried leaves at burrow openings to force mice out of hiding. Musahars are also well known for their quick hand capture method, which entails employing their dexterity and expertise to manually grab rats. This indicates a deep understanding of rodent behavior and multigenerational survival techniques.

Although they are mostly landless agricultural laborers, the Musahar people have valuable expertise in traditional, low-input farming techniques that enable them to fulfill their subsistence needs. Rainfed paddy agriculture is one of their main techniques, where they skillfully employ flood-prone locations to cultivate rice without the usage of irrigation infrastructure. They also use crop rotation and intercropping, planting many crops in a single growing season, to preserve land productivity and enhance soil fertility. Sustainable agriculture that is suitable for their local environment

has long been understood by Musahars. To keep pests away from their crops, they apply neem leaves, ash, and cow dung, among other organic pest control methods.

Since they do not own any property, most Musahars are either sharecroppers or agricultural laborers for more affluent landowners (Sharma, 2017a). Their agricultural skill is unused due to a lack of government support and funding. In addition to employment based on natural resources, which have historically provided alternative sources of income, the Musahar community has acquired a range of handicrafts and labor-intensive skills.

The Musahar group has historically specialized in bamboo-based handicrafts, a vital talent that supports their daily living and home demands. They are adept in weaving baskets, making durable containers for carrying and storing grains, such as dalo and bhakari. They are also skilled at weaving mats, making sukul-floor mats out of bamboo and river grass. Musahars also construct sturdy bamboo fish traps, such gagri and pachhai, which are essential to their fishing techniques. Another important use of their bamboo artistry is roof thatching, in which they utilize straw and dried bamboo leaves to create effective and sustainable roofing materials for their dwellings.

However, with the increasing availability of plastic and metal substitutes, the demand for traditional bamboo handicraft has declined. The government and non-governmental organizations (NGOs) have attempted to revive these skills by supporting bamboo-based microbusinesses (Chhetri & Smith, 2019a).

In recent decades, many Musahars have become increasingly dependent on daily wage labor, particularly in physically demanding and low-paying jobs. Many of them work in brick kilns, where they must shape, move, and stack bricks under challenging circumstances for long stretches of time. Others provide physically taxing labor for government infrastructure projects by working in the road construction industry. Additionally, Musahars typically labor in seasonal agriculture, often for little compensation or job stability, in areas that produce rice, wheat, and sugarcane. These kinds of labor have become essential sources of income for the community in the face of limited access to official work options and land. Musahar workers frequently endure exploitative conditions and lower wages than other workers as a result of caste-based discrimination (Gautam, 2020a).

Despite their marginalization, the Musahar community's rich oral tradition is a crucial part of their cultural identity. Through their songs, folktales, and rituals, they pass forth historical experiences, collective values, and survival knowledge. Oral storytelling and folktales have been used by elders in the Musahar group to preserve their cultural identity and collective memory. These stories often center on themes of struggle and survival, detailing how their ancestors triumphed against persecution and misfortune. Animal folklore, which portrays birds, snakes, and wild creatures as omens or guardian spirits, is also quite common. Additionally, mythological tales are crucial because they describe local deities and guardian spirits that are believed to keep their communities safe and guide community life. The Musahars maintain a strong bond with their history, beliefs, and surroundings through these oral traditions (Chhetri & Smith, 2019b).

Musahar culture is heavily reliant on music, with folk songs and ceremonial chants embedded in both daily and ceremonial life. Work songs are sometimes performed to maintain the energy, rhythm, and coordination of agricultural laborers. During religious holidays like Maghe Sankranti and social events like weddings, marriage and festive music bring the community together in joyful expression. Additionally, lament songs are a powerful means of communicating the emotional problems and tribulations of the community, particularly those resulting from caste-based oppression. These musical customs not only preserve cultural memory but also support the Musahars' resilience and unity (Gautam, 2020a).

Despite their ancient animistic and nature-worshipping beliefs, the Musahar group has gradually incorporated Hindu religious traditions into their cultural life. Despite this transformation, they continue to practice some traditional practices that show their close connection to nature and the beliefs of their ancestors. They include making offerings to woodland spirits and ancestors, as well as asking for blessings and protection for abundant crops. Community festivals usually align with natural cycles, such as harvest celebrations and monsoon prayers, to highlight their reliance on and reverence for nature. Folk dance customs are also highly significant as a vibrant expression of their spiritual and cultural identity, especially at religious rituals and social gatherings. However, these indigenous spiritual practices have gradually

disappeared as a result of forced assimilation and sociopolitical marginalization (Sharma, 2017c).

The traditional skills and vocational abilities of the Musahar group demonstrate their rich cultural legacy, deep ecological knowledge, and adaptability. Their ability to fish, hunt, subsistence cultivate, make handicrafts, work with bamboo, and engage in labor-intensive jobs has traditionally maintained them despite landlessness, caste prejudice, and sociopolitical isolation. Due to economic hardship and industrialization, their oral traditions and folk culture—which are crucial markers of their identity—are increasingly at risk of disappearing. Finding, safeguarding, and integrating these indigenous abilities into economic policies, cultural preservation initiatives, and sustainable development plans are essential to raising their level of living and ensuring their cultural survival.

Environmental Sustainability and Indigenous Practices Among Musahars

Knowledge of their native ecosystems and sustainable resource management techniques has long been important to indigenous cultures, such as the Musahar people of Nepal. These traditions are vital to biodiversity conservation, climate change adaptation, and sustainable resource use because they have been cultivated over centuries of peaceful coexistence with the environment. This section looks at their traditional knowledge and practices, which include sustainable resource management, climate change and natural catastrophe adaptation, and biodiversity conservation.

The Musahar group has developed a variety of resource management techniques to maintain a healthy relationship with nature and live in their challenging socioeconomic context. In addition to being sensible and ecologically beneficial, these long-standing traditions show a deep respect for the environment and nearby resources. The Musahar people engage in agroforestry, a sustainable land-use strategy that combines trees and crops to create a more diverse and productive environment. This approach reduces erosion, increases soil fertility, and provides resources for food, medicine, and construction materials. In order to create a symbiotic ecosystem that supports biodiversity, they grow multifunctional trees like sikakai, neem, and mango alongside their crops. To maintain soil health and reduce pest and disease threats, they employ crop rotation and intercropping, which entails growing various crops in the same area. Chemical fertilizers and insecticides are used less often using this technique.

Musahars also employ integrated pest management (IPM) strategies to further support environmental sustainability, substituting natural methods for synthetic pesticides, such as introducing predatory insects and neem-based treatments (Tamang & Dahal, 2021b). Without diminishing natural resources, these methods are crucial for maintaining agricultural yields, soil health, and water retention (Chhetri & Smith, 2019a).

Water management plays a major role in the agricultural operations and overall livelihood strategies of the Musahar population, particularly in the water-scarce Terai area. To address this difficulty, they have developed several traditional techniques for efficiently using and saving water. One such method is rainwater harvesting, wherein Musahars collect and store rainfall for use in conventional wells, tanks, and ponds during the arid seasons. They also construct gravity-fed water canals as part of their traditional irrigation systems, which provide a steady flow of water to their fields and support agricultural output. The Musahars also use wetland farming, utilizing lowland wetlands for rice fields, to prevent excessive use of water resources. Water is naturally retained in these wetlands.

These sustainable water management practices are crucial to their agricultural prosperity and resiliency. These water management strategies are very sustainable since they use natural water cycles to protect water resources and promote agricultural operations (Sharma, 2017b).

The Musahar community's adaptation techniques to climate change and natural calamities show its resilience and ability to adapt to changing environmental circumstances. The community's experience with droughts, flooding, changing climates, and unpredictable weather patterns has led to the development of innovative adaptation solutions. As local weather extremes like unpredictable monsoons and prolonged dry spells are made worse by climate change, the Musahar community has adjusted its farming practices to ensure food security and resilience. They have embraced crop varieties that can thrive in dry conditions, such as millets, sorghum, and wheat, which are more resistant to water constraint. Because they can withstand extended submersion, Musahars grow flood-resistant rice varieties, such as irrigated lowland rice, in flood-prone locations.

Despite changing climatic conditions, these climate-resilient crops ensure steady agricultural output by helping the community mitigate the effects of unpredictable

weather patterns. These modifications provide food security even when traditional crops fail due to changing climate circumstances (Poudel et al., 2022a).

Because they reside in flood-prone locations, especially in the Terai region, the Musahar group has developed a number of flood resistance methods. One such method is to erect dwellings on stilts; traditional Musahar residences are built on elevated platforms to prevent flooding. In order to predict future floods, the community has also developed flood-forecasting methods based on traditional knowledge. Musahars may anticipate floods and take the required precautions, such as moving to higher land if needed, by keeping an eye on seasonal winds, animal behavior, and variations in river levels. These methods reflect the community's deep understanding of their environment and ability to adapt to flooding challenges (Gautam, 2020b).

The Musahar population has adapted to erratic weather and natural calamities by seasonal mobility and diversification of their sources of income. Many Musahars sometimes travel to cities or other regions to work in construction or seasonal agriculture in order to augment their income during the off-season when agricultural labor is sparse. Additionally, the community has been increasingly diversifying its revenue streams by engaging in handicrafts, fishing, and small-scale commerce. These other sources of income provide a more stable financial foundation during tough times, enabling the Musahars to better manage the challenges posed by economic hardship and environmental instability. By using these tactics, the community can protect itself from economic shocks caused by climate change and unpredictability in the environment (Tamang & Dahal, 2021c).

Impact of Modernization and Socio-Economic Changes

Modernization and urbanization have brought about significant socioeconomic changes to communities throughout the world, including the Musahar village in Nepal. The traditional ways of life that have sustained the Musahar people for many centuries are now under danger, despite the fact that these advances have improved living conditions and created opportunities for economic growth. The challenges posed by urbanization and modernization, the loss of indigenous knowledge and skills among the younger generation, and the impact of governmental policies on traditional methods of sustenance are all examined in this part.

The Musahar group is mostly found in rural Nepal, where rapid urbanization and industrialization have led to substantial social changes. These changes have both beneficial and bad effects on the community's traditional ways of life. As a result of urbanization and industrialization, more individuals are relocating from rural to urban regions in search of better employment prospects. This movement is sometimes triggered by the lack of sustainable livelihood opportunities in rural regions. In metropolitan regions, new employment like construction labor, factory work, and service sector positions have often replaced traditional occupations like subsistence farming, fishing, and handicrafts (Poudel & Shrestha, 2020). Younger generations of Musahars are leaving their ancestral land in greater numbers to seek work in cities, which is causing a decline in the local, traditional economies that have been the backbone of the Musahars' existence.

Because of the expansion of urban values, lifestyles, and global culture, the younger generation is often exposed to new kinds of education, media, and technology that are foreign to traditional Musahar beliefs and practices. These factors may cause younger Musahars to become less interested in protecting the community's environmental knowledge and cultural heritage in favor of modern consumerism and technological advancements. For example, older generations still possess traditional skills like as farming, fishing, and bamboo handicraft, but these are increasingly losing their cultural relevance in urban settings (Sharma, 2021a).

Urban migration, especially among the younger age, sometimes disrupts social cohesion and traditional family patterns in rural areas. The nuclear family model that urbanization has fostered contrasts sharply with the extended family and community-based support systems that the Musahar people have traditionally relied upon. This movement diminishes the importance of festivals, traditional customs, and collective farming—all of which have been essential for maintaining social stability and cultural continuity. The social fabric that had held the Musahar group together is under stress because of migration and urbanization (Shrestha & Gurung, 2019).

As the Musahar group is under more and more strain from industrialization, the loss of indigenous knowledge and traditional skills among younger generations has grown to be a serious problem. These changes endanger not just the survival of traditions but also the community's ability to maintain its cultural identity.

Crop rotation plans, soil fertility management techniques, and irrigation methods are examples of old agricultural expertise that is rapidly being replaced by modern farming methods. Younger generations in particular are less interested in farming and would prefer to work or pursue education in urban areas. As a result, the elder generation's understanding of sustainable farming practices is vanishing. This shift is particularly concerning in light of climate change as traditional knowledge can be crucial for resilient farming practices (Chhetri & Sharma, 2020).

Indigenous people have passed down their knowledge of traditional healing techniques and the medicinal properties of local plants for generations. However, the increasing prevalence of Western medicine and the availability of medications in metropolitan areas have led to a decrease in the use of traditional healing practices among younger Musahars. Herbal treatments, sometimes collected from the surrounding region, and the community's knowledge of local ecosystems supporting their health are at risk of disappearing. As urban healthcare access increases, the younger generation could think that traditional cures are no longer essential (Tamang & Dahal, 2021d).

The Musahar people have historically made a living mostly from handicrafts including bamboo weaving, ceramics, and basketry. As these crafts were passed down from one generation to the next, each one's abilities developed. However, the younger generation is less interested in artisan employment due to the allure of metropolitan living. The community finds it increasingly challenging to maintain cultural continuity through craft-based economic activities as a result of the decline in traditional handicraft production (Khadka, 2018).

Government policies have affected the Musahar community's way of life in both beneficial and bad ways, particularly in the areas of land reform, education, and economic growth. While some regulations have tried to improve access to resources and services, others have inadvertently sidelined indigenous customs. Government efforts to increase literacy and education have given Musahar youth more alternatives, particularly with regard to employment in the public and commercial sectors. However, these practices have also contributed to the loss of traditional knowledge because the official education system often disregards indigenous knowledge systems.

Because of their focus on secular education, the younger generation is less likely to learn or respect traditional handicraft, health, or agricultural skills (Bhatta, 2020). As

a result of the transition to a more modern economy, traditional talents that formerly helped the Musahar community are now sidelined.

Initiatives for land reform aimed at ensuring equitable land distribution and boosting agricultural productivity have had mixed effects for the Musahar group in Nepal. The commercialization of resources and the split of communal landholdings have undermined traditional forms of community resource management, even while land redistribution has improved access to land for certain people. This move to individual land ownership has resulted in the loss of shared agricultural methods that were vital to the community's existence. Additionally, the commercialization of land has led to the replacement of traditional, subsistence farming methods with profit-driven agriculture and cash crops (Shrestha, 2019).

Government-led development projects like roads, electricity, and healthcare have helped rural people, but they have also upended traditional ways of life. Traditional land uses are often displaced by large-scale infrastructure projects, such as highways, irrigation systems, and hydroelectric dams. Because these projects reduce the amount of land accessible for traditional livelihoods like farming and fishing, the community may become even more estranged from their traditional norms and become dependent on wage labor in cities or larger towns (Gautam & Sharma, 2021).

Due to modernity and social shifts, the Musahar group in Nepal has experienced both possibilities and difficulties. Urbanization has contributed to the loss of traditional livelihoods and indigenous knowledge, even as other components, such as better healthcare and education, have enhanced communal standards of living. The decline of traditional health practices, the loss of agricultural expertise, and the collapse of artisanal skills are some of the most significant problems affecting the Musahar. A variety of results have also been brought about by government initiatives, including both growth potential and unforeseen effects like the marginalization of traditional traditions. Going ahead, lawmakers must recognize and support the integration of indigenous knowledge into sustainable development plans.

Education and Indigenous Knowledge Transmission

Education has a significant impact on the future of every society, and for indigenous tribes like the Musahar people in Nepal, education is directly related to the preservation of their knowledge and traditions. However, it is sometimes challenging to

integrate indigenous knowledge into the modern educational system. This section looks at the barriers to formal education faced by Musahar children, the importance of integrating indigenous knowledge into formal education, and the role elders play in passing down traditional knowledge.

Even while education is widely recognized as a method of attaining social and economic mobility, many indigenous youngsters, especially the Musahar, encounter significant challenges when attempting to enter and thrive in the official school system. These challenges are multifaceted and stem from a combination of social, cultural, and institutional factors.

One of the biggest barriers keeping Musahar youngsters from getting an education is poverty. The Musahar group is one of the most marginalized in Nepal because of their limited access to resources. Since many families struggle to meet their fundamental needs, schooling becomes less important.

Due to school fees, transportation costs, and the need to labor to support the family (e.g., by farming or performing housework), children may not be able to attend school regularly. As a result, many children, especially females, miss out on their education, which eventually hurts their socioeconomic chances (Subedi & Tamang, 2020).

The Musahar population resides in rural regions, which usually lack enough facilities and trained educators. Schools in rural areas may lack the resources they need, and the education system is typically underfunded. The curriculum is frequently not adapted to the reality of rural and indigenous living, and children may struggle with it if it does not correspond to their actual experiences. Furthermore, a lot of schools teach in Nepali, which might be a hurdle for children who use Maithili or other regional languages at home (Shrestha, 2021).

Another significant barrier to schooling is cultural discrimination. Caste-based prejudice against the Musahar group has long existed in Nepal, and this social stigma often has an impact on the educational system. Bullying, isolation, or a feeling of alienation among children from disadvantaged neighborhoods, such as the Musahar, can lead to high dropout rates. Furthermore, traditional perspectives on education, which often prioritize domestic or agricultural labor over formal schooling, reduce girls' prospects of obtaining a formal education (Bista, 2020).

In indigenous societies, elders play a crucial role in maintaining traditional knowledge and cultural practices. Like many other indigenous tribes, the Musahar community primarily relies on oral traditions to preserve and pass on knowledge to future generations. Knowledge that has been passed down through the generations is an essential component of cultural identity and community cohesiveness.

Elders are the primary repository of traditional agricultural knowledge, including crop management, irrigation, soil fertility, and ecologically sustainable seasonal farming practices. They also teach younger community members how to hunt, fish, and engage in other subsistence activities that are vital to Musahar livelihoods. Through storytelling and hands-on training, elders ensure that the next generation learns how to interact with the land and natural resources in a sustainable way (Sharma & Subedi, 2021).

In addition to imparting practical knowledge, elders are responsible for educating the community's cultural and spiritual values. These include knowledge of the oral history, festivals, customs, and folklore of the Musahar people. Through the transmission of myths, tales, and traditional songs, elders pass along important cultural practices as well as the moral and intellectual frameworks that form the community's worldview. This process strengthens community relationships and protects the Musahar identity for future generations (Tamang & Rai, 2019).

Elders have an important role in helping young people in the Musahar community interact. They help educate societal standards, family responsibilities, and ethical values through informal education. Young individuals participate in and observe daily life, absorbing the norms and values that shape their conduct in the society. By modeling decency, cooperation, and civic responsibility, elders act as mentors to younger generations (Gurung, 2020).

Given the challenges the Musahar community experiences in accessing high-quality education, there is growing recognition of the importance of integrating indigenous knowledge systems into the official education system. This integration is crucial for safeguarding and promoting indigenous cultural heritage, as well as making education more relevant to indigenous populations.

By including indigenous cultures' traditional knowledge systems in formal education, they may be respected and recognized. By including subjects like farming

techniques, cultural customs, and local environmental knowledge in the curriculum, students may understand the value of their legacy. In addition to improving learning engagement, this fosters a sense of pride in one's identity among indigenous pupils. Indigenous pupils' academic performance and level of involvement have been demonstrated to rise with culturally relevant curriculum (Bhatta & Shrestha, 2020).

To successfully integrate indigenous knowledge into the classroom, educators need to be knowledgeable of and skilled in culturally responsive pedagogy. This means training teachers to appreciate and integrate indigenous perspectives into their lesson plans and teaching methods. Teachers need to be aware of the social dynamics and cultural practices of the Musahar community in order to provide a learning environment that respects and embodies its values. Bridging the gap between the home and school languages can be facilitated, for example, by offering bilingual education or using Maithili in addition to Nepali (Poudel, 2020).

A more collaborative approach between educational institutions and indigenous populations is necessary to incorporate traditional knowledge into formal education. Schools can work with local elders and civic leaders to ensure that traditional knowledge is included in the curriculum. In the classroom, elders can be invited to share their knowledge, and their involvement can help create a more welcoming atmosphere for learning. These collaborations can be particularly advantageous in disciplines like as environmental science, where indigenous ecological knowledge can improve students' understanding of sustainability and resource management (Khadka & Sharma, 2021).

The education of Musahar children is hampered by a number of issues, including financial constraints, prejudice, and a lack of culturally relevant curriculum. However, the elders' role in passing down traditional knowledge remains a crucial part of the Musahar community's resiliency. By integrating indigenous knowledge into official education, the Musahar community may be able to bridge the gap between traditional and modern education while maintaining its cultural identity and adapting to the demands of the modern world. Furthermore, safeguarding the legacy of the Musahar people for future generations may depend much on the educational system's ability to foster a greater understanding and respect for indigenous knowledge.

Conclusion and Implications

The Musahar community, one of Nepal's disadvantaged indigenous groups, possesses a wealth of traditional knowledge and abilities that have been passed down through the ages. This knowledge, which covers livelihood practices, healthcare, and environmental management, is crucial to the community's survival and sustainability in the face of rapid social and environmental change. The key findings are outlined in this part, along with the importance of preserving indigenous knowledge and suggestions for community empowerment and sustainable development.

The Musahar people, who have traditionally practiced subsistence farming, fishing, and handicrafts, have faced marginalization and prejudice in Nepal's sociopolitical context. Despite these challenges, their cultural practices, crafts, and oral traditions remain vital parts of their identity. Indigenous knowledge is crucial to the Musahar community's existence, especially in the fields of agriculture, fishing, and herbal medicine. Their knowledge of local ecosystems, especially land cultivation practices and water management, has allowed them to live sustainably within their environmental setting.

The Musahar community employs sustainable resource management practices that contribute to the broader goal of environmental sustainability, such as organic farming and the conservation of local biodiversity. However, natural catastrophes and climate change are posing a threat to these activities, requiring adaptation. Urbanization and modernity have had a significant influence on the Musahar community, causing younger generations to lose their traditional knowledge and abilities. Formal schooling and outside economic possibilities have often undermined the transmission of indigenous knowledge.

Integrating indigenous knowledge into formal education institutions, which usually focus on mainstream curricula, has proven challenging. Even though elders are still essential in transmitting traditional knowledge, modern education institutions should include indigenous knowledge to increase their reach. Indigenous knowledge preservation is vital for addressing contemporary concerns including biodiversity loss, climate change, and sustainable development, in addition to being crucial for preserving cultural identity. Indigenous knowledge systems offer practical solutions that can complement modern scientific methods for managing the environment and conserving

resources. Centuries of contact with the natural world have improved these systems. The cultural identity of the Musahar people is inextricably linked to indigenous knowledge. The foundation of their heritage is made up of customs like storytelling, traditional ceremonies, and handicrafts.

Particularly when it comes to land and water management, indigenous knowledge provides effective, sustainable resource use techniques. In light of climate change, these methods can offer valuable insights into how communities might preserve biodiversity, preserve ecological balance, and adjust to environmental stresses. Initiatives undertaken by the community should be supported and reinforced in order to preserve indigenous knowledge and cultural customs. This can mean organizing cultural celebrations, creating platforms for intergenerational knowledge exchange, and putting in place local government structures that prioritize traditional ecological knowledge in resource management.

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