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Indigenous Land-Based Perspectives on Environmental Sustainability: Learning from the Khasis Indigenous Community in Bangladesh

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Abstract: This research explores Indigenous land-based perspectives on environmental sustainability, centering on the Khasis Indigenous community in Bangladesh. With a critical connection to their land-based cultural heritage and environment, the Khasis community offers a distinctive perspective for examining environmental challenges. Emphasizing the traditional land-based knowledge and practices of the Khasis, as well as their insights on environmental challenges, this study employs a land-based theoretical framework. It sheds light on the adaptive strategies of Khasis Indigenous communities amidst shifting environmental conditions, illustrating how they integrate sustainable practices into daily life by drawing upon Indigenous land-based knowledge and practices to mitigate environmental risks. Additionally, the research scrutinizes the challenges faced by the Khasis in preserving their land-based knowledge, practices, and identity in the face of a global environmental crisis. The findings contribute to broader discussions on Indigenous land-based knowledge and practices and their significance in contemporary climate discourse. By amplifying the voices of the Khasis Indigenous community's land-based knowledge and practices, this study advocates for the incorporation of Indigenous perspectives into climate policies and interventions. It underscores the necessity for a more inclusive and culturally sensitive approach to environmental sustainability, one that acknowledges and respects the resilience of Indigenous communities like the Khasis in Bangladesh.

Keywords: Indigenous; land-based perspectives; environmental sustainability; Khasis community; adaptive strategies



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1. Introduction

Indigenous land-based perspectives on environmental sustainability challenges and adaptations offer unique insights deeply rooted in traditional knowledge systems, sustainable practices, and a profound connection to the natural environment [1,2]. Indigenous communities, often disproportionately affected by environmental sustainability change, rely on their land-based knowledge to navigate and mitigate the impacts of environmental challenges [3]. These perspectives underscore a holistic understanding of ecosystems, highlighting the interdependence of all living beings. Indigenous adaptation strategies blend contemporary approaches with time-honored practices, reflecting Indigenous relationships with their land. Recognizing and integrating these Indigenous land-based perspectives is crucial for fostering resilience and developing inclusive, effective solutions to global environmental challenges [4].

The recognition of Indigenous land rights has strong importance for many minority communities in Bangladesh, as there is no constitutional recognition for Indigenous

communities [1–4]. Land rights and land-based identity are critical for many Indigenous communities as they are deeply connected to their land-based cultural identity, traditional practices, and overall well-being. Without formal recognition of their land rights, many Indigenous communities face ongoing threats of displacement, loss of livelihoods, and cultural erosion due to land grabs, resource exploitation, and development projects [5]. Indigenous land rights provide a legal framework for communities to assert their ownership and stewardship over ancestral lands, enabling them to protect sacred sites, preserve biodiversity, and sustain their traditional way of life [5–8]. Indigenous land rights create self-determination for many Indigenous communities to participate in decision-making processes regarding land use, natural resource management, and sustainable development, ensuring that their voices are heard and their interests are respected. Without Indigenous land rights, many Indigenous communities continue to face marginalization, discrimination, and social injustices, highlighting the urgent need for legal recognition and protection of their land rights [9–12]. In Bangladesh, Indigenous peoples strive for recognition of their unique cultural identities and rights to ancestral lands, often facing challenges related to land dispossession and cultural assimilation [10,13].

Many Indigenous communities in Bangladesh (both plain land and hilly land) face significant environmental challenges that threaten their livelihoods, cultural practices, and overall well-being. One of the critical challenges is the land degradation and loss of natural habitats due to deforestation, land conversion for agriculture, unsustainable resource extraction, and unsustainable imposed tourism [4,9–11,14]. These activities significantly disrupt traditional sustainable land-based practice and their ecosystems, diminish biodiversity, and erode ecosystem services vital for Indigenous communities' survival, such as clean water, fertile soil, and natural flood protection. Intensive agricultural practices, including the use of chemical fertilizers and pesticides, degrade soil quality and contaminate water sources, posing health risks and undermining agricultural productivity [4,14]. As a result, many Indigenous communities in plainland areas experience dwindling harvests, food insecurity, and increased vulnerability to environmental hazards such as droughts, floods, and soil erosion.

The climate crisis exacerbates these environmental challenges, increasing the frequency and intensity of extreme weather events, altering rainfall patterns, and exacerbating seasonal variability [5,15,16]. Plainland Indigenous communities are particularly vulnerable to climate impacts due to their reliance on rain-fed agriculture and proximity to rivers and coastal areas prone to flooding and cyclones. Rising temperatures and changing precipitation patterns disrupt traditional farming calendars and exacerbate water scarcity, exacerbating competition over dwindling resources and triggering conflicts within and between communities. Sea-level rise threatens to inundate low-lying areas, displacing Indigenous populations and further exacerbating their vulnerability. Addressing these environmental challenges requires holistic approaches that integrate Indigenous knowledge, promote sustainable land and resource management practices, and enhance community resilience to climate change through adaptation and mitigation measures tailored to local contexts [5,9,15–18].

In this paper, we critically used the three terms environmental sustainability change, land-based theoretical framework, and sustainability resilience strategies [5,15,16]. From an Indigenous land-based perspective, environmental sustainability refers to Indigenous land-based practice across ecosystems, societies, and economies [15,16]. It advocates for land-based identity, land-based strategies that honor interconnectedness, mitigating degradation, and safeguarding future generations [5]. The land-based theoretical frameworks offer a critical lens through which to understand and address environmental challenges and land-based adaptations [9,18]. It centers on land-based community traditional practice emphasizing reciprocal relationships between humans, land, and community. Land-based sustainability resilience strategies are deeply rooted in traditional land-based knowledge and cultural practices, reflecting a critical understanding of ecosystem dynamics and human-nature relationships [13].

This study focuses on the Khasi Indigenous community, one of the many land-based communities in Bangladesh. The Khasi Indigenous community in Bangladesh faces adverse impacts from environmental change, including contemporary deforestation and forest degradation, further exacerbated by the burgeoning tourism industry and ongoing modern development ([14] p. 16). Residing in the Greater Sylhet region, located in northeastern Bangladesh, the Khasi community's livelihoods are intricately linked to the local ecology, with their Indigenous knowledge playing a significant role in maintaining environmental balance ([19] p. 311). The Khasi rely on local plants within the forest for their livelihoods and have continuously adapted to changing environmental conditions [6]. Despite the significance of Khasi Indigenous knowledge, the existing literature inadequately addresses the intersection of Khasi Indigenous land-based knowledge and environmental sustainability ([7] p. 579). There is a gap in understanding how environmental sustainability change impacts the livelihoods of the Khasi community, particularly concerning the challenges posed by deforestation and modern reforestation.

This research seeks to deepen our comprehension of the Khasi Indigenous people and their intricate livelihoods intertwined with forests and the environment. The study explores the pivotal role played by the Khasi Indigenous community in safeguarding the local environment, focusing on the nexus between their land-based practices in betel leaf cultivation and underlying belief systems. It aims to unravel the worldviews held by the Khasi Indigenous people concerning environmental challenges, primarily stemming from deforestation and reforestation activities. Lastly, it seeks to scrutinize the Indigenous knowledge of the Khasi community regarding mitigating the impacts of environmental sustainability change. Structurally, the paper unfolds across four sections: researcher positionality, theoretical framework and methodology, research findings, and a comprehensive discussion leading to a conclusive summary.

2. Researcher Positionality

Researcher positionality is a critical consideration in studies involving land-based communities [8]. It acknowledges that researchers bring their perspectives, biases, and cultural backgrounds into the research process [5,15]. Understanding and recognizing these aspects enable researchers to approach their work with greater self-awareness, navigating the complexities of Indigenous research more ethically and respectfully [16,17]. Crucially, researcher positionality plays a vital role in establishing trust and rapport with Indigenous communities, which have historically faced exploitation, mistrust, and cultural appropriation by outsiders, including researchers [9,18]. Transparency about researchers' positionality establishes a foundation of trust by demonstrating a commitment to acknowledging and respecting the community's values and ways of knowing.

The first author, born and raised in a land-based minority family in Bangladesh and currently a settler of color residing in Treaty 6 and 7 territories in Canada, brings 17 years of experience conducting research with Indigenous and non-Indigenous communities in Canada and South Asia. Supported by a network of Indigenous, visible minority immigrants and refugees, and Black communities, scholars, students, practitioners, and professionals, the first author approaches research as a lifelong responsibility.

The second author, a Manipuri Indigenous in Bangladesh, has worked with the Indigenous people of Bangladesh for over 25 years, recognizing the integral connection between land and the Manipuri culture and identity. With an intimate familiarity with the Khasi community as an immediate neighbor and a deep understanding of their culture and environmental perspectives, the first author serves as a suitable advocate to articulate the concerns and experiences of the Khasi community regarding environmental impact and sustainability changes.

The third author, born in Canada and educated in Europe and Canada, acknowledges her position of privilege and power as a white settler descendant but actively engages in unlearning and re-evaluating to achieve allyship. She aims to uplift Indigenous voices and advance Indigenous rights in the pursuit of justice.

Considering our respective researcher positionalities has been instrumental in deepening our understanding of Indigenous communities and their profound connection to the environment and adaptive practices. The experiential insights gained through our research not only enrich our comprehension of the Khasi people but also have the potential to enhance our study of other Indigenous communities within Bangladesh and beyond. This valuable experience serves as a foundation for broader insights into the diverse ways Indigenous groups navigate their relationship with the environment and adapt to evolving challenges. Therefore, researcher positionality assumes a crucial role in advancing ethical, collaborative, and culturally sensitive research practices within Indigenous communities, fostering relationships based on respect and equity and generating research that is genuinely beneficial to the involved communities.

3. Theoretical Framework and Methodology

We used a land-based theoretical framework for this research as it serves as a critical lens to analyze and challenge the pervasive structures of colonialism and imperialism [9,10]. Rooted within and emerging from land-based culture and practice, the land-based theoretical framework recognizes historical injustices and ongoing power imbalances. It seeks to dismantle Eurocentric perspectives and methodologies, emphasizing the voices and agency of marginalized communities [10]. This framework interrogates dominant narratives, highlighting how colonial legacies continue to shape social, political, and cultural landscapes [11]. Not only theoretical, but this framework is also inherently political, advocating for the decolonization of institutional structures and the restoration of autonomy and self-determination for historically marginalized and oppressed communities [12,20].

Following a land-based theoretical framework, we conducted this fieldwork in August 2023 among the Lawachara Khasi Punji in Kamalganj, Moulvibazar District, Bangladesh. Khasi Indigenous communities inhabit the forest, and their livelihoods depend on it. Culturally connected to the land, Lawachara is situated in the West Bhanugach Reserved Forests in the Sylhet Forest Division, covering an area of 1250 hectares. The following map illustrates the location of our study area.

There are two Khasi Indigenous Punjis in the Lawachara Park in the Srimongal area in Bangladesh. However, we chose Lawachara Punji because it is in the park and they are facing environmental sustainability change issues in their daily lives. There are forty families in the Punji with a total population of 300. The Punji is 107 years old, and it is running under the Khasi social system, which is a local Indigenous governing system. There are seventy-three Punjis (Khasi villages) in the greater Sylhet region. We conducted in-depth interviews and open-ended questions with the Mantri (Head of the village) and local Khasi communities in Lawachara Punji in Kamalganj under the District of Moulvibazar.

In-depth story-sharing plays a pivotal role in facilitating decolonial conversations, as highlighted by Kovach (2021) and Wilson (2020) [20,21]. This research method, central to decolonial conversation research, fosters a deeper understanding of Indigenous perspectives and experiences [21,22]. By prioritizing Indigenous voices and narratives, it serves to decolonize both the research process and the researchers themselves. Moreover, story sharing facilitates reconnection with the land and land-based knowledge, essential aspects of Indigenous cultures and worldviews [23]. Two of the authors come from minority communities in Bangladesh and have strong ties with longtime local people. We regularly talk with them in our daily lives. To strengthen our connections with community elders, knowledge-keepers, and leaders, we found that storytelling was a great way to learn. This approach allowed us to delve into complex issues while respecting the community's cultural customs, in relaxed and safe settings. During our discussions, we viewed ourselves (both community members and researchers) as a family, with shared responsibilities. Sharing stories helped create a comfortable space for everyone to talk about community needs and responsibilities.

As a critical component of community-based research, decolonial conversations through story-sharing contribute to the revitalization of Indigenous knowledge systems

and the promotion of cultural resilience [11]. Thus, we applied in-depth decolonial conversations to conduct the study because it was the most suitable method to conduct this research [22]. We carried some guided land-based questions that also helped us to maintain the flow of discussion. Khasi has a language, which makes it difficult to communicate either in Bengali or English. However, the head of the Punji was fluent in Bengali, which compelled us to choose the in-depth interview or story-sharing method [8]. Moreover, the daughter of the Mantri was also a key respondent for this research. It was a face-to-face conversation with Khasi Indigenous. The method was useful as it enabled us to conduct the fieldwork: In-depth interviewing is a qualitative research technique that involves conducting an intensive informal conversation with seven community members (those who are Elders and Knowledge-keepers in the community) to explore their perspectives on a particular idea [24]. Our five major research questions are as follows:

- What are the key principles and practices of environmental sustainability within the Khasis Indigenous community in Bangladesh, and how do they reflect traditional land-based knowledge and customs?
- How have historical and contemporary socio-political factors influenced the resilience and adaptive strategies of the Khasis Indigenous community in the face of environmental challenges and changes?
- What are the specific environmental concerns and priorities of the Khasis Indigenous community, and how do they align with or diverge from mainstream environmental discourses and policies?
- How do traditional systems of governance and decision-making within the Khasis Indigenous community contribute to the sustainable management of natural resources and ecosystems?
- In what ways can collaborative research and knowledge exchange between the Khasis Indigenous community and external stakeholders support the development of culturally relevant and effective environmental sustainability initiatives?

4. Results

Through our decolonial land-based learning with Indigenous communities, we have learned many insights into critical issues surrounding environmental sustainability challenges and their land-based solutions. Our exploration of these communities provides a rich understanding of the nuanced perspectives that shape their experiences. In our findings, we have emphasized certain critical viewpoints that shed light on the complex interplay between Indigenous land-based knowledge, environmental sustainability, and the impacts of environmental sustainability change. In Table 1, we organized the themes and subthemes of our findings.

Table 1. Community Perspectives on Environmental Challenges Their Land-based Adaption.

Environmental Challenges	Indigenous Land-Based Practice as Sustainability
Monoculture Plantation	Land-Based Knowledge and Practice (silviculture)
Colonial Tourism	Educational Curriculum
Chemical Fertilizer	Land-based Protocols
Wild animals extinction	Indigenous Networks
Colonial Foods and Disease	

4.1. Environmental Challenges from Indigenous Perspectives

The Khasis Indigenous community in Bangladesh grapples with the critical impacts of the environmental sustainability crisis, as shifting weather patterns disrupt traditional agricultural practices crucial to their sustenance. Increased frequency of extreme weather events, such as floods and cyclones, threatens the community's livelihoods and erodes their cultural ties to the land. Because of extreme environmental sustainability impacts, the Khasis face heightened vulnerabilities, emphasizing the urgent need for environmental

sustainability resilience strategies that respect and integrate their indigenous knowledge and sustainable practices.

Many community members refused to use the terms 'environmental sustainability' and/or 'resilience' as they are considered colonial, instead they refer their land-based practices, land rights, and land-based spirituality as their forms of environmental sustainability or resilience. Many of the community members suggested that we as researchers need to focus on community land rights as their 'environmental sustainability' or 'resilience'. Many community members complained that by the name of 'environmental sustainability' or 'resilience', many researchers and policy-makers want to impose outsider perspectives over the communities' everyday land-based practices. Therefore, we focused our findings according to community suggestions to center their needs in this paper.

4.1.1. Monoculture Plantation and Khasi's Perspectives

Monoculture plantations are against the local environment and Khasi's understanding of ecology. The Bangladesh Forest Department introduced rubber, teak, and eucalyptus, which are harmful to the local environment. For example, the local birds and animals do not interact with these trees. Local birds do not make nests in these trees. The Khasi believe that these exotic trees release toxic gases. A natural forest needs diversity with different types of local trees. One interviewee stated:

Bahirer theke ana gashuguli pani beshi tane, fole anonnya gasguli bachete parena: jemon jarul gas-o khotikor [non-natives trees suck larger amount of water, which becomes a threat to native trees].

Monoculture trees are profitable for supplying the local furniture business. Moreover, they consume larger amounts of water from the ground. As a result, other local trees do not receive sufficient water. Subsequently, other smaller trees, herbs, and grass cannot survive in the area. So, the Khasi believe the forest Department and other corporations should stop monoculture plantations in the forest.

4.1.2. Impacts of Colonial Tourism

The current form of tourism is referred to by the Khasi as colonial. This is because outsiders are coming to the community without community consent and destroying their natural everyday forest life and ecosystem. Tourism impacts the local forest and the normal livelihoods of the Khasi community. The forest officials introduce toys, artificial sheds, and other infrastructure for tourists that are viable to natural forests. These additions are contradictory to the native trees, plants, and wildlife. According to Mantri, nobody should disturb the forest. The natural forest provides all the facilities for tourists. The Khasi mention that they do not need to add any artificial items to the forest:

Akhane dekhben artificial benger chata ase, thakar babostha hochhe agolu prokriti abong bonke nosto kore dichhe. [You will find there are artificial umbrellas, and accommodations for tourists in the forest, but these infrastructures destroy the beauty of nature and the forest].

During our field investigation, we found that some tourists use loudspeakers in the park while they listen to music. Natural music and artificial music should not be together. Further, tourists come into the punji and ask unwanted questions about the Khasi food habits. For example, the tourists asked if the Khasi eat snakes or frogs.

4.1.3. Impact of Chemical Fertilizer on Land

Modern chemical fertilizer impacts the local flora and fauna. For example, the owners of tea gardens and lemon gardens use chemical fertilizer that also kills fish and other wild animals. There is a creek near the Khasi Punji. There were many fishes in the creek such as small shrimp, kuchiya (eel), and local fish. Several community members suggested that they (the Khasi) do not see those fishes anymore in the creek. Tea workers used to come to hunt eel with spears in the creek, but suddenly eel is rarely seen.

There was a rare fish in Lawachara Creek. It is known as bamash in Sylheti and his-sen in Khasi language. This fish is not seen anymore in the area. They used to come out of the creek to eat bamboo shoots. The Khasi would catch them before they go back to the water bodies. As one of the community Elder-3 explained that:

Age amra anek mach dekhesi akhono segulo hariya gese, kintu icha mach dekhs jai [We can see that many local fishes have disappeared, but still there are small shrimp in the creeks and streams].

The Khasi further suspect that environmental sustainability change has affected their livelihoods and other living species. For example, pesticide kills the fish. The available fish such as eel fish facing extinction in the area.

4.1.4. Irregular Rainfall

Irregular rainfall has become a common scenario over the years in Srimangal and Kamalganj regions. This region was known as the rainiest place in Bangladesh. However, the rainfall rate drops down significantly. There was regular rainfall and winter in the area. However, now, sometimes, rain comes during unexpected seasons. The local environmental sustainability has changed and the community has observed the variations. The Khasi had not experienced a heatwave in their whole life; however, this year in 2023, the community experienced its first heatwave. For instance, the Betel leaf cultivation is the main livelihood for the Khasi. Their uses include medicinal (bad breath, constipation, headache itches, swelling of gum, etc.), mental health (chewing produces a sense of well-being, alertness, and energy), and nutritional [25]. Betel leaves require regular rain and water supplies. Production rates have dropped because there has been less rainfall for the last couple of years. The quality of betel leaf depends on the local environment. However, environmental sustainability change impacts the production rate of betel leaves. Environmental sustainability change also impacts the harvest season. For example, they used to cut longer betel leaves between July and August. But the seasons have shifted to other months because of irregular rainfall.

4.1.5. Wild Animals Face Extinction

Native wildlife faces extinction in the national park. Khasi observes that several important local wild animals have disappeared such as hornbill, pangolin, and porcupine. However, other animals have increased in the area such as wild boars, monkeys, and foxes. These animals come to the locality because they have lost their habitats and food. There were black bears, but they have become rare animals in the forest. However, there are varieties of snakes, reptiles, lizards, frogs, and birds in the forest. There are different types of snakes found in the Lawachara forest. The community never had an experience of being bitten by snakes. Wild animals are part of the Khasi life. Kichu bonya prani dekha jaina, abar arek dike kichu pranir sangkhya bere jachhe [some important wild animals are not seen anymore, but in contrast, other wild animals have increased in the area as mentioned in the text]. Khasi mentions that there has been an imbalance in wild animals. Natural ecology has been disrupted because some animals have either changed their habitat or disappeared.

4.1.6. Colonial Foods and Disease

The Khasi Indigenous people have now been introduced to modern food and discovered that it is related to new diseases because of environmental sustainability risks. The Khasi have historically eaten dry fish. However now, due to monoculture plantations, the Khasi believe that dried fish may contain the chemicals of the fertilizer. Further, the fish producers may use chemicals during the fish processing. The Khasi believe cancer and other diseases originate from fertilizer and chemicals. An interviewee stated:

Amader jibone kunodin Doctor r kache jete hoini khub maratok na hoile, kintu ajkal anek natun rugh chole asese punjite [We rarely visit Doctor unless it is life

threatening; however, we are experiencing the new diseases that have arrived in the Punji].

Herbal treatment is effective, but recently they have observed that there are three diabetes patients in the Punji. The Khasi claim that modern food items have caused diabetes because they had never heard of the disease before. They were never required to visit a doctor until a disease was life-threatening. The community used to depend on stream water and natural water. However, now, the community has started using water from wells. With the advent of electricity in the area, the Khasi use deep tube-well water with an electric motor.

4.2. Indigenous Land-Based Practice as Environmental Sustainability

The Khasis Indigenous community in Bangladesh exhibits remarkable land-based adaptability to the environmental crisis through their deep-rooted connection to their land-based practice in their everyday practice. Land-based traditional agroecological practices and sustainable land management, the Khasis navigate the challenges of changing weather patterns. Their intimate understanding of local ecosystems enables the development of resilient strategies, emphasizing the importance of honoring and integrating indigenous land-based knowledge in broader environmental sustainability adaptation efforts.

4.2.1. Indigenous Land-Based Knowledge and Practice

Trees stand as an indispensable facet of Khasi livelihoods and culture, with the Khasi Indigenous community assuming a pivotal role in safeguarding the forests and contributing to environmental stewardship. This study delves into the Khasi people's intricate worldviews regarding the forest and environment. Notably, the livelihoods of the Khasi community are intricately tied to the forests, trees, and the cultivation of betel leaves. To elucidate these dynamics, direct quotes from members of the Khasi Indigenous communities have been incorporated into the study, ensuring the inclusion of their perspectives, with full consent. A statement from the head of the Punji from the Khasi Indigenous community further underscores the significance of their role in environmental conservation:

Gash shara amra kalpona karte parina r gas shara pan hoina [Mantri mentions that we cannot imagine a life without trees: no trees, no betel leaf].

The community respects every tree and cannot cut it without a reason. However, they cut dead and dry trees from their gardens. Moreover, several cultural trees are protected. Therefore, it is prohibited to cut trees. Khasi were animists, but most of them converted to Christianity. They used to worship trees, waterfalls, and stones. Still, 10 percent of Khasi people follow the ancient belief system. The traditional forest and their land-based knowledge have been an important element of their daily lives as part of their environmental sustainability since time immemorial. So, Khasi Indigenous communities use traditional forest resources as a food bank. For example, they collect mushrooms from bamboo gardens and dead trees. However, because of the on-going environmental sustainability crisis, there are very few foods and several deadly mushrooms in the forests. Mantri mentions that recently, six Khasi died while eating wild mushrooms in Meghalaya. The loss of trees affects Indigenous knowledge, as this knowledge is getting lost.

A strong spiritual bond exists between the Khasi Indigenous people and both trees and betel leaves. Engaging in discussions about the forest stirred deep emotions among the Khasi, as it constituted an indispensable aspect of their existence. For the Khasis, trees and forests hold immense significance, shaping not only their livelihoods but also influencing their beliefs and cultural identity. Unfortunately, the shift towards human-engineered afforestation, replacing traditional forests, contributes significantly to the environmental sustainability crisis and detrimentally affects the Indigenous community's land-based practices.

4.2.2. Indigenous Land-Based Educational Curriculum

Indigenous land-based knowledge and practice are important in the national educational curriculum of Bangladesh. Indigenous people are part of nature and the environment. Indigenous people play a major part in protecting the forest and environment. Indigenous people are protecting the forest across Bangladesh. However, the authorities in Bangladesh do not include this information in the educational curriculum. For example, Mantri claims in the following way:

Adibhasira pahar r paribeshke rakhsa kartese ata kundin boi pustoke athoba report a asena [Books and reports do not mention that Indigenous communities play a key role in protecting the forest and environment].

Mantri claims that their actual voices have not been presented in documents such as publications, reports, and research. Another finding is that the Punji does not have a government-funded school. However, the Punji has a self-funded primary school, which is up to class five. The drop-out rate is quite high, according to the Mantri. They feel that they are required to increase their literacy rate to protect their rights on land, forests, and the environment.

4.2.3. Land-Based Practice as Strengthening Indigenous Networks

The Indigenous network plays a vital role in raising environmental rights in Bangladesh. The Mantri has a connection with the Bangladesh Indigenous People's Network on Environmental Sustainability Change (BIPNCC). Indigenous people of Bangladesh are trying to negotiate and bargain with the State about their rights and role in relation to environmental sustainability change. The Khasi try to raise their points to the government through this platform. Sometimes, unrealistic decisions come from the central and local governments about forest management. In contrast, the Khasi carry forward sustainable forest management techniques because they have been living in the forest for many years. The top-down government approach does not work in the forest because it is against the system of local Indigenous environmental management.

The Mantri mentioned that tourism spots are Indigenous areas in Bangladesh and tourists are infringing these areas. To this day, there are still trees and forests in Indigenous areas because they nurture and protect the environment. According to Mantri, a country should have 25% of its land as a forest area. But Bangladesh has about 10% forest land, which is not sufficient. There should be more forest cover in the country. One interviewee stated:

Amra sobar sohojugita chai poribes-ke rakhsa korte [Khasi mantri suggests collective effort is required to save the forest and environment].

The Khasi suggest collective effort and teamwork are required to protect the environment. The Khasi seek support and cooperation to save the forest and environment. The Khasi have realized that only the Khasi community can't protect the forest; they cannot do it alone.

4.2.4. Implementing Indigenous Land-Based Protocols

Khasi land-based culture and beliefs are connected to betel leaf plantations. There are certain land-based rules and norms for entering the betel leaf garden. For example, the workers are required to take a shower before going to the garden. Sometimes, they need to shower with warm water to sanctify the body. It is a part of the Khasi land-based culture. In fact, Mantri mentions that they are practicing this to protect from two diseases: utram (leaves rotting) and gura pacha (root rotting). Khasi is careful with these two diseases. It can bring significant losses to their economy. If these diseases occur one interviewee stated:

Akbar ei rug hoile somosto gas kete felte hoi r amade anek khoti hoi orthonoit-inhabe [They are required to destroy the whole betel leaf plantation if these two diseases infest the garden].

The Khasi are worried that their betel leaf cultivation will face challenges due to the mentioned disease. They are further worried that outsider people, particularly tourists, can bring into the forest these harmful diseases.

5. Discussion

Many Indigenous and land-based minority communities in Bangladesh suffer greatly from environmental crises resulting from ongoing colonial environmental management practices that undermine community-sustainable land-based practices [26]. The failure to recognize and support these communities' everyday land-based sustainable practices has led to numerous environmental challenges. This study sheds light on how continued colonial environmental management disrupts the everyday land-based practices of these communities, contributing to issues such as deforestation, river dredging, sand extraction, industrial development, and vehicular carbon emissions. In this discussion session, we focused on the multifaceted impacts of monoculture, chemical fertilizers, and colonial tourism on both the environment and Indigenous communities. Monoculture, with its focus on single-crop cultivation, poses significant threats to land biodiversity and the livelihoods of Indigenous peoples. This industrialized approach contrasts sharply with Indigenous land-based knowledge, which emphasizes sustainable cultivation practices rooted in traditional land-based culture and practice. Colonial tourism further marginalizes Indigenous communities by commodifying their cultures and lands, often without their consent. Therefore, addressing these issues requires a holistic approach that respects Indigenous knowledge, promotes sustainable practices, and advocates for Indigenous communities to reclaim their rights and autonomy.

The Khasi Indigenous communities grapple with persistent challenges arising from modern development and encroachment on their lands. Traditionally engaged in cultivating various crops for supplemental income on their forested lands, the Khasi Indigenous face external pressures, exemplified by attempts from rubber and tea plantation companies to access their ancestral territories. This encroachment has led to the Khasi being embroiled in legal disputes against corporate land grabbers, resulting in an increasingly untenable way of life. The escalating external pressures from industrialists and land grabbers significantly impede their lives, rendering their agricultural lands insufficient to meet their needs ([27] p. 578).

Khasi and other Indigenous people face displacement from their ancestral land. Particularly, land grabbers and musclemen file false cases against these communities to grab their lands. In fact, this action is a threat to the local environment and resources. This research suggests deforestation and forest degradation occur due to tree felling and forest land conversion. Khasi Indigenous people are facing the impact of man-made environmental sustainability change in Lawachara. Khasi livelihoods and culture are intertwined with forests, nature, and spirituality. They are not facing naturally induced environmental sustainability change or mere development challenges. Study claims that human-induced impacts are obvious in the forests because they invite deforestation and forest degradation [28]. The Khasi observe the following changes in the area for the last couple of years:

They have experience in environmental sustainability change;

Impacts of tourism degrade forests, agriculture, and traditional livelihoods;

Local fish are not seen;

Local rare wild animals have disappeared suddenly.

The Khasi are not recognized as Indigenous people in Bangladesh. Representing approximately 1% of the population, the lack of recognition leaves their economic, political and land rights ignored [29]. In fact, a government directive in 2022 directed media and university professors not to use the term Indigenous [29].

We have learned that environmental challenges are an unfamiliar term to the community, but they are observing the weather changes. Khasi has experienced more weather variations than usual. For example, Khasi observes that they had an exceptional heatwave

in 2023. They had never had this type of experience before. Most of the time, they expect natural seasonal weather along with rain. The rainfall has changed, and as well the temperature has increased. Betel leaf cultivation requires adaptation to the local environmental sustainability of greater Sylhet. Studies explore how local weather becomes irregular. Studies claim that erratic rainfall, heavy fog, and cold weather affect betel leaf cultivation [30]. Moreover, betel leaf cultivation requires seasonal rainfall because irregular rainfall impacts the production rate and quality of leaves. Similarly, another study claims that fog and heavy cold affect betel leaf production because they originate from increased temperature and rainfall pattern changes [13]. This study also points out that Khasi maintains diverse types of trees in the home garden, which contributes to protecting from gust and land erosion. Moreover, diverse trees and fruits may work as a backup because if one crop faces failure, other crops help to recover it and make it survive (p. 15). Khasi produces local fruits just for self-consumption and not for commercial use. Indigenous knowledge of Khasi helps to mitigate the impact of environmental sustainability change and adapt to it for several years, but it has become a challenge recently.

Land-based reforestation initiatives, ostensibly aimed at ecological restoration, inadvertently destroy Indigenous trees and plants. Concurrently, the tourism sector disrupts natural wildlife movement and breeding patterns. The challenges are further compounded by hill cutting, encroachment onto Khasi lands, and the introduction of modern infrastructure in their regions [31]. These instances of modern development and territorial expansion directly contradict the Khasis' deeply rooted worldviews, as the practices engender adverse effects on the environment, livelihoods, and cultural heritage of the community.

5.1. Monoculture and Its Impacts on Land and People

This research found that the Khasi prefers to keep a diversity of trees in the forest. The headman argues that without diversity, a forest is incomplete. He mentions that a forest is made of diverse types of local trees. The headman knows which trees are natives and which are non-natives. Recently introduced monoculture trees impact the Lawachara forest and its unique biodiversity. Particularly, a co-management project introduced non-native trees such as oak, pine, and lohakath (*Xylia dolabriform*) in some parts of the park [32]. For example, teak can be good for commercial and furniture making; however, its impact is long-term in the area. He observes that local tree varieties die due to water shortages and other unknown reasons. The Mantri claims that these non-local trees consume a larger amount of water that disturbs other local trees. Monoculture impacts local animals and birds too. Local animals and birds can identify which trees are suitable for making their nest. Local trees are suitable for local animals. These animals can detect which tree produces toxins and threaten their lives. Local animals' activities and reproduction happen based on local wild fruits, flowers, and vegetables.

5.2. Non-Human and Human Ways of Living

The Khasi has a spiritual connection with wild animals and birds. The community knows their food, fruits, seasonal movements, and lifestyles. There are many trees and vines in the forest. There are many shade trees. They provide shelter for insects, lizards, and birds. There are 167 plants, 4 types of amphibians, 6 species of reptiles, 246 birds, and 20 species of mammals in the Lawachara park [33]. About 18 families of Hollock gibbon have given the Park a flagship attraction; other key species include Capped Langur, Slow Loris, Pig-tailed Macaque, Orange-bellied Himalayan Squirrel, and Barking Deer. The park is surrounded by 30 villages (including two Khashia Punji inside the park) and 6 Tea gardens, which are dependent on the park's natural resources [33].

If a shade tree is cut down, other dependent species will die or lose their habitats. Every species plays an important role in preserving the local environment. For example, woodpeckers do not make nests in every tree. They are very selective and make holes carefully. Then, the hornbill was a common bird in the Lawachara and this bird indicated people's seasonal changes. Khasi used to depend on animals, their movement, and their

availability to understand seasonal calendars, weather forecasts, and natural calamity warnings. The ability to do so has been lost due to changes in environmental sustainability and the loss of forests and animals.

5.3. Indigenous Land-Based Knowledge and Sustainable Cultivation

This research claims that Khasi maintains Indigenous knowledge and techniques to protect betel leaves from pests and diseases. There is no visible boundary for the Khasi Punji. They live on the hillocks. The Khasi people come across unknown visitors from morning to evening. So, any tourist can enter the village and disturb their daily livelihoods. Most of the tourists take pictures without their consent. Sometimes, tourists try to enter the garden of betel leaves, which is culturally protected. There is a high possibility of the spread of unwanted diseases or pests.

The Khasi had experience with pests and diseases of the leaves. Betel leaf cultivation is a highly sensitive activity because it is vulnerable to any pest. It takes a sufficient amount of time, care, and cost to produce a mature and quality product. A disease can wipe out a complete garden. Moreover, the Khasi has no other alternative occupations except betel leaf cultivation in our research area. They believe that any transferrable diseases may spread to the trees and betel leaves in the garden. They keep a kuwa (well) near the entrance of the garden. The workers used to take a shower before going to the garden. However, nowadays they just wash their face, mouth, hands, and legs. This practice applies both to coming in and going out of the garden.

Sometimes, they bathe before going to their farmland and then take care of trees and fruits. They believe that if they take a bath all evil will be cleaned away and the farm will not be attacked by pests and diseases. If they think the infested twigs and leaves touch their bodies, they immediately take their bath to stop the spread of diseases. This way the vegetation and forest resources are being protected and conserved [34].

5.4. Using Chemical Fertilizer and Impact on Livelihood

Chemical fertilizer impacts Khasi's daily livelihoods, health, and food. For example, local fish face extinction because chemicals are in local streams and creeks. Then, chemical fertilizer creates new diseases, particularly diabetes, among the Khasis. In contrast, people use chemical fertilizers to increase the production rate. Using chemicals such as fertilizer, pesticides, and medicine is higher in South Asia at a rate of 29% compared to Latin America and Asia-Pacific countries [35]. For example, 63% of local respondents claim they rely on nature to eke out their livelihoods [35]. So, local responses to environmental sustainability change impacts are related to people's livelihoods [35].

5.5. Colonial Tourism and Its Impact on Indigenous People

Lawachara National Park is losing its unique flora and fauna. This research reveals that Lawachara has become a recreational center for tourists and visitors. People come from across the country for picnic purposes. Tourists look for green areas where they can relax. So, Bangladesh requires reforestation on a large scale though it cannot go back to earlier unique natural forests. However, the State can take strong steps to protect the identified protected forests from further destruction. Moreover, the State can emphasize reforestation. It will be difficult to stop the tourists from coming to Srimangal and other areas. However, the relevant authorities can set strict rules for tourists and visitors so that they can enjoy their park visit without disturbing wildlife and the environment. One study claims that the number of wildlife species decreases due to the visitors in the park [36]. There are set rules such as signboards and notices for visitors in Lawachara, but tourists do not follow them properly due to a lack of monitoring and a fine system. If the awareness does not work, a fine system may help to minimize noise and sound in the park. "Land acquisition in name of development and tourism imperils the situation because the concept of eco-tourism has not developed yet in this country" [37].

Tourism is related to infrastructure development; eco-tourism is a new concept in Bangladesh. The new structure in the forest is against the nature and environment. The Khasi are not happy with the new infrastructure development in the park, which includes a tourist railway through the forest. There is already natural infrastructure where people can sit for a while and enjoy the beauty of nature. This new infrastructure is an encroachment into the park by tourism agencies that disturb the total ecology. The Khasi have a spiritual connection with native animals, whereas an outsider may not have those feelings. Thus, Indigenous people protect forests and natural resources from contemporary encroachment [38]. Khasi Indigenous people are born and live in the forest. They understand better than other people about managing the forest and living things. For example, there are different types of insects, and they create natural music. They communicate with one another with their sounds and inform their position. We saw that some of the tourists mimicked the sounds of monkeys and birds. It further irritates the wild animals. Thus, local wild animals and birds panic and the noise forces them to change their habitats. For example, unexpected sounds disturb the breeding and incubation periods of birds. Wild birds and animals come to a local village to take shelter. Python and a slow-moving monkey are rescued from the neighboring locality. Nowadays, it has become common news in daily papers that wild animals are rescued by people. Moreover, a main road goes through the national park and connects between Kamalganj and Srimangal. Similarly, a rail line also goes through the national park. So, snakes and monkeys die regularly from road accidents. The local people, environmental activists, and development agencies have all demanded the relocation of the rail line from the park to avoid accidents that kill wild animals.

The Khasi region distinguishes itself as eco-friendly due to the utilization of local plant materials and the application of Indigenous knowledge, resulting in fertile soil through a local biomass system [31]. The Khasi community, in alignment with their adaptation of local terms, considers adaptation an ongoing practice, a sentiment similarly echoed in the socio-political context of Australian Indigenous communities [39]. Trees assume a dual role for the Khasi, contributing both to survival and environmental management. The integral practice of Indigenous tree plantations is grounded in cultural traditions, encompassing past experiences for present and future considerations.

Indigenous community-led or ecotourism tourism holds significant importance for environmental sustainability in Indigenous communities in Bangladesh. By embracing these approaches, Indigenous communities can protect their traditional knowledge and cultural practices to offer meaningful economic sources for the community. Through community-based tourism initiatives, local people become stewards of their own land, actively involved in conservation efforts and protecting natural resources. The ecotourism may offer economic opportunities that incentivize the preservation of traditional lifestyles and ecosystems, reducing the pressure to exploit natural resources unsustainably. Indigenous community-based and ecotourism tourism not only contributes to environmental sustainability but also empowers Indigenous communities to preserve their cultural heritage and maintain sovereignty over their land.

Our research findings offer valuable insights and strategies that can be beneficial for addressing the environmental challenges faced by many plain land Indigenous communities in Bangladesh. By focusing on the experiences and practices of the Khasi Indigenous community, this research provides a platform for understanding Indigenous knowledge systems, traditional land management practices, and community-based approaches to environmental sustainability. One of the key contributions of this research is its emphasis on Indigenous land-based perspectives regarding land stewardship and environmental conservation. By documenting the Khasi's traditional ecological knowledge and cultural practices, the research highlights alternative models of resource management that prioritize sustainability, resilience, and intergenerational learning. These insights can inform efforts to revitalize Indigenous land-based practices and integrate them into contemporary conservation and development initiatives, fostering collaboration and mutual learning between Indigenous communities, policymakers, and researchers.

This study explores the lives of Indigenous communities, focusing on their dependence on forest resources. However, the intricate interplay of environmental sustainability change, illicit human activities, and developmental initiatives significantly impacts their livelihoods. The alteration of landscapes, particularly through the destruction of hills, exerts discernible effects on the local weather patterns, detrimentally influencing the ecosystem in the region [23]. An illustrative consequence is the observable shift in annual rainfall patterns, coupled with the manifestation of warmer summers in the Sylhet division. The study emphasizes the importance of native plants in environmental sustainability change mitigation, asserting that their eco-friendly attributes invite wildlife populations and contribute significantly to sustainable ecology [25]. The preservation of forests is deemed crucial for the continuity of Indigenous cultures, particularly those intricately connected to forest living [40]. Grainer further argues that sustainable forest management, guided by government-regulated logging practices and comprehensive scientific research, is advocated to reduce deforestation [40].

6. Limitation of the Study

The research was carried out over a short period. The decolonial conversation was the most suitable method to gather data in the field. The participant observation method could have been applied to collect further information from the field. However, there were no such facilities that researchers could use to stay longer with the Khasi community due to infrastructure and cultural issues. As well, most of the community members were not fluent in Bengali, which was a barrier to data collection.

7. Conclusions

The Khasi Indigenous land-based culture is their environmental sustainability. They have been living in the forest for generations. However, environmental sustainability change, deforestation, reforestation, and modern development affect their livelihoods. The Khasi play a crucial role in protecting nature and the environment. They use Indigenous knowledge in environmental management. They know how to survive with betel leaf cultivation in the forest while not disturbing wild animals, trees, plants, or the total environment. Thus, Khasi does not welcome expansion into their forest territory with modern development such as reforestation (mono-culture), tourism, and artificial infrastructure development. The Khasi would like to keep the forest and nature pristine, without outsiders' influence interfering. So, any development program should not be planned and implemented without the consultation of the local community. The Khasi community should be involved in decision-making about forest issues, particularly at local and national levels. Indigenous voices should be included in the report and education curriculum of Bangladesh so that people can understand the role of Indigenous communities in environmental conservation. Then, Indigenous voices and knowledge will help reduce carbon emissions and deforestation in the country. Moreover, the involvement of the Khasi community in forest management will contribute to protecting the national park and other reserve forests in Bangladesh. The Khasi face displacement from their ancestral land. Most of the time, they face false cases filed by land grabbers, influential people, and corporations. More research in the future is required to document how the Khasi are tackling the issue of forest preservation related to ancestral land, identity, and environmental protection. Therefore, recognizing Indigenous land rights for Bangladeshi Indigenous and minority people is critical for building environmental sustainability. This recognition empowers them to safeguard biodiversity, preserve critical ecosystems, and mitigate the adverse impacts of climate change. Honoring Indigenous land rights not only promotes environmental stewardship but also upholds social justice and Indigenous sovereignty.

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