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Understanding Climate Change Through Chakma Perspectives

An Ethnographic Study of Perception, Vulnerability and Adaptation in Dighinala, Bangladesh

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Abstract

This thesis looks into how the indigenous Chakma community in Dighinala, Chittagong Hill Tracts (CHTs), Bangladesh, perceives and interprets climate change and the strategies they follow based on their cultural knowledge and experiences to adapt to the changes. Rather than treating climate change as an isolated driver of disruption, the study takes a broader view, showing how multiple forces - market expansion, state policies, population growth, land pressure, etc. interact with climate variability to shape everyday life. Based on ethnographic fieldwork conducted across different *paras* (small settlements in the hill tracts, also called villages by local administration) in Dighinala, the thesis explores lived experiences and community narratives that reflect both loss and adaptation. The thesis is organized into three analytically distinct but interconnected chapters: Perception, Impact, and Adaptation.

The perception chapter draws on interpretive anthropology, environmental hermeneutics, and memory studies to examine how the Chakma interpreter changes through personal memories, collective histories, spirituality, and ecological knowledge. Rather than isolating climate as an abstract phenomenon, community members interpret change through sensory experience, spiritual beliefs, and socio-historical narratives, often blurring the boundaries between climate, state, and market-driven transformations.

The impact and vulnerabilities chapter draws on political ecology and the concept of climate change as a "threat multiplier" to document the lived consequences of these transformations. Focusing on agricultural shifts, ritual erosion, health vulnerabilities, and the fragmentation of social ties, the chapter highlights how climate-related impacts are distributed unevenly by gender, age, social position, and land access. Importantly, it moves beyond loss-centered narratives to also examine how infrastructural expansion, education, and market engagement have opened new, if complex, pathways of opportunity. The impacts of climate change, in this context, are not experienced as isolated events but as relational and cumulative processes that intersect with historical marginalization and structural inequality.

Chapter five focuses on the Chakma's adaptation practices. It reconceptualizes adaptation not as a set of technical responses but as culturally situated and socially negotiated practices. Using ideas from resilience theory, political ecology, and "negotiated modernity," this chapter analyzes how the Chakma responses emerge through livelihood decisions, everyday practices, gendered labour, and changing aspirations. While adaptation strategies such as wage labour, crop diversification, or

irrigation can foster resilience, they also generate new vulnerabilities and dependencies, especially for women, the elderly, and the landless. The chapter argues that adaptation is a double-edged process: it is both a means of survival and a site of emergent precarity.

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Chapter 1: Introduction

Background

Climate change is not an abstract or distant concern in today's world anymore. It has emerged as one of the most pressing global challenges of the 21st century. From big cities, coastal areas, and riverside towns to hard-to-reach hilly areas, its effects are now visible everywhere (Shampa, 2022). Indigenous and local peoples across various regions, including taiga, tundra, high-altitude mountain ecosystems, tropical rain forests, and near sea-level coastlines, share compelling narratives and experiences of climate change (Crate & Nuttall, 2009, p. 9). Even though the consequences of climate change vary across different groups, people who are directly dependent on environment and its resources, face the greatest challenges (Crate & Nuttall, 2009, p. 12). On the other hand, individuals who depend on environment for their livelihoods perceive and interpret these changes differently based on their culture and experiences. Similarly, they utilize their traditional knowledge and lived experiences to adapt with the changing conditions (Shampa, 2022). Thus, understanding the perceptions of climate change and adaptation practices among the most impacted is crucial for shaping national discourse and for the development and implementation of effective adaptation strategies (Uddin, 2022).

Bangladesh, with a population of over 165 million (BBS, 2022), is one of the most climate-vulnerable countries in the world. It ranked seventh on the 2021 Global Climate Risk Index (Eckstein et al., 2021). Geographic position, low-lying terrain, and socio-economic dependency on agriculture and natural resources make the country vulnerable to climate-induced threats such as sea-level rise, saline intrusion, erratic rainfall, and extreme weather events (Mustajib, 2020). The country has a rich cultural and ethnic diversity with over 54 indigenous communities speak at least 35 languages, beside the dominant Bengali people (Berger, 2019, cited in Islam et al., 2022, p. 3). The preliminary report of the 2022 census by the Bangladesh Bureau of Statistics (BBS, 2022) stated that Bangladesh's indigenous population totals 1,650,159 (1% of the overall population). As per IWGIA (International Work Group for Indigenous Affairs, n.d.), majority of the indigenous people lives in the rural areas of flatland districts in the north, southeast, and the Chittagong Hill Tracts (CHTs). Their livelihoods are largely dependent on natural environment and its supplies, and they often inhabit diverse yet fragile ecosystems. They are among the most disadvantaged, marginalized and vulnerable populations worldwide (Mamtaz et al. 2018). Mustajib (2020) asserted that the sociocultural settings of indigenous people are intricately connected to their natural surroundings. They have engaged in agro-forest farming systems for generations which are closely linked to seasonal patterns. However, the

relationship between these communities and their environments is being affected by climate change implications (Mustajib, 2020). According to the United Nations Permanent Forum on Indigenous Issues (2008), indigenous population are some of the first to directly experience climate change impacts because of their dependence and close relationship with the environment and its resources for their livelihoods.

Historical Ecology and the Political Economy of the CHTs

The CHTs represent a geographically and culturally distinct region in southeastern Bangladesh, characterized by socio-political conflict and environmental changes. The region is consisted of three districts – Rangamati, Khagrachhari, and Bandarban. The region is the home to 13 ethnic groups (Mohsin, 2022) including the Chakma community being the primary focus of this ethnography. The CHTs' history is characterized by colonial exploitation, state-led marginalization, and prolonged conflict, all of which have influenced the contemporary vulnerabilities faced by its indigenous populations (Mohsin, 2022; Adnan, 2007; Ahmed, 2017). The British colonial administration systematically dispossessed indigenous lands by introducing cash crops, commercial logging, and establishing tea plantations, thereby disrupting traditional agro-forestry systems and communal land tenure practices (Mohsin, 1997, cited in Ahmed, 2017). This legacy of resource extraction and land alienation intensified following Bangladesh's independence in 1971, when the state policies aimed at assimilating the CHTs into the national mainstream, often undermining indigenous rights and ecological sustainability (Roy, 2000).

In the early 1960s, the construction of the Kaptai hydroelectricity dam submerged 40% of the arable land in the CHTs and displaced approximately 80,000 to 100,000 people, predominantly Chakma families (Adnan, 2007). The state further promoted migration of Bengali settlers to the region. The interventions resulted in a disruption of traditional livelihoods and an escalation of ethnic tensions, which further marginalized indigenous communities (Mohsin, 2022; Adnan, 2007; Ahmed, 2017). The competition for land and resources as well as other state-driven marginalization led to two and a half decades of armed conflict (between 1970–1997) between indigenous groups (led by the Parbattya Chattagram Jana Samhati Samiti (PCJSS) and its military wing, 'Shanti Bahini' [Peace Force]) and the Bangladeshi military (Mohsin, 2022, p. 251; Ahmed, 2017, pp. 85-88). The conflict was marked by extensive violation of human rights including sexual violence (Mohsin, 2022, p. 255). The 1997 CHT Peace Accord sought to address these issues; however, its implementation has been partial and inconsistent. Consequently, many indigenous communities continue to lack secure land rights and meaningful political representation (Adnan, 2007).

Understanding the Chakma community's current experiences of climate change requires understanding these historical and political dynamics. These factors influence both their vulnerabilities to climate change impacts and their adaptation capacities. Thus, any analysis of the Chakma's climate change perceptions and adaptation practices needs to be situated within the broader historical and political framework. This will help to understand the interconnections among environmental change, cultural identity, and social inequality.

Climate Vulnerabilities, Knowledge and Adaptation

Climate change intensifies the vulnerabilities of indigenous communities adding further layer to their already existing historical and political-economic difficulties (United Nations Permanent Forum on Indigenous Issues, 2008). Various climatic events like drying up of streams and wells, groundwater depletion, biodiversity loss, infertility of crops, decline in seed variety resulting from irregular and inconsistent rainfall, soil erosion, landslides, climate-induced diseases, etc. pose significant threats to their survival (Mustajib, 2020; Shampa, 2022). The impact patterns of climatic shifts also vary according to farming practices, geographic location, and livelihood patterns. For instance, Akter et. al. (2013) in their work in Lawachara, Sylhet, found that agricultural production of the Garo, Khasia, Tripura, and Manipuri communities are affected by climate change. Communities in the CHTs, on the other hand, faced scarcity of drinking water and landslides (Mamtaz et al., 2018). These disparities underscore the necessity for context-specific analyses of climate change among different indigenous groups.

On the other hand, indigenous communities possess rich understanding of how changing climatic conditions are impacting the ecosystem they rely on (Shampa, 2022). Indigenous communities, despite their vulnerabilities, actively engage with the impacts of climate change rather than remaining passive victims. Drawing from their understanding, knowledge and experiences, they identify their adaptation mechanisms (United Nations Permanent Forum on Indigenous Issues, 2008). Thus, consideration of the indigenous communities' adaptation practices in the design of development initiatives and policies may enhance local acceptance, improve community participation in the implementation, and foster trust in their local knowledge and practices (Shampa, 2022). Belief and perceptions held by local people can offer crucial insights for policymakers in formulating informed climate change and disaster policies (Uddin, 2022). In fact, indigenous peoples are vital to and active in many ecosystems that inhabit their lands and territories. Their local adaptation strategies may assist

societies in addressing forthcoming changes (United Nations Permanent Forum on Indigenous Issues, 2008).

In this context, it is important to explore how indigenous communities perceive and interpret climate change, their vulnerabilities, and how they adapt to it. This will help us understand their perspectives, factors that drive their interpretation, and their indigenous initiatives to address these changes. This exploration can also facilitate the development of culturally appropriate and environmentally and socially sustainable adaptation strategies that incorporate indigenous knowledge and practices.

Research Question:

This thesis aims to understand how the indigenous Chakma community perceive and interpret climate change, and the strategies they follow based on their cultural knowledge and experiences to adapt with the changes. My research question is:

- How do indigenous Chakma community of Dighinala perceives and interprets climate change, and what role do their local knowledge and experiences play in their adaptation practices?

From this basic research, a key ambition of this thesis is to provide insights into how local community-based adaptation can be grounded and made relevant to develop culturally appropriate and innovative solutions in response to changing environmental realities.

Theoretical and Conceptual Framework

This section outlines the theoretical and conceptual frameworks that guided this research. As I delved into the Chakma's climate experiences, I realized that climate is not just an environmental phenomenon; it is lived realities influenced by history, memory, culture, and socio-politics on the ground. Understanding these lived experiences require an inter-disciplinary perspective that situates cultural narratives, memories, interpretations, and negotiations of climate change within specific ecological, historical, economic and socio-cultural contexts. Therefore, I draw on an interdisciplinary theoretical framework that integrates:

1. Interpretive Anthropology, Environmental Hermeneutics, Cultural Ecology, and Traditional Ecological Knowledge (TEK) (mainly to analyze perception and interpretation; but also relevant to other chapters).
2. Political Ecology and resilience frameworks to understand how socio-economic and political factors influence climate vulnerabilities and adaptation strategies.

3. Negotiated Modernity and resilience framework to analyse how the Chakma engagement with modernity is not a linear transition from tradition to modernity but an ongoing process of adaptation, hybridity, and selective incorporation of external influences.

Below I elaborate on some of the above-mentioned theories along with some analytical concepts while I plan to discuss the rest as I move on with the specific chapters in the later sections.

Interpretive Anthropology and Environmental Hermeneutics: Perception, Memory, and Meaning-Making:

The most convincing theoretical framework for my exploration of the Chakma's perspectives and cultural interpretations of climate change is interpretive anthropology, especially the work of Clifford Geertz (1973 & 2000). It provides me with a framework to examine how the Chakma construct meaning around climate change, embedding their experiences in narrative expressions, metaphors, storytelling, and rituals, rather than assuming a uniform model of climate change. In *The Interpretation of Cultures* (1973), Geertz, following Max Weber, said, "Man is an animal suspended in webs of significance he himself has spun. I take culture to be those webs, and the analysis of it to be therefore not an experimental science in search of law but an interpretive one in search of meaning" (Geertz 1973, p. 5). He argued that culture is a semiotic system that can be read, interpreted, and understood in the same way as a text. His concept of "thick description" underscored the importance of a methodological approach that moves beyond surface-level observations to uncover the layers of meaning embedded in cultural practices (Geertz, 1973, p. 6). Through this lens, perception itself becomes a culturally mediated process influenced by history, cosmology, and local epistemologies. For example, in his analysis of the Balinese cockfight, Geertz (1973, pp. 412-453) demonstrated how a seemingly simple event is filled with deep symbolic significance, reflecting broader social structures, values, and tensions. His work highlighted the interpretive nature of cultural analysis, emphasizing the need to explore the subjective experiences of people being studied. In *Local Knowledge: Further Essays in Interpretive Anthropology* (2000), Geertz further extended this idea stressing that all knowledge is situated within its own cultural framework and must be understood in relation to the specific historical and social contexts in which it emerges. Challenging the idea of a grand, "general theory" (Geertz, 2000, p. 4) for explaining human conduct, he argued that cultural knowledge loses its value when it is reduced to laws and models. Anthropologists should instead continue to concentrate on the ways various cultures create their own authoritative and knowledge structures and understanding how people make sense of their world in their own terms (Geertz, 2000, pp. 6-7). This approach, as Geertz called it "understanding of understanding", can be referred as hermeneutics or

more specifically “cultural hermeneutics” (Geertz, 2000, p. 5): interpreting how people make sense of the world, within their own cultural contexts. However, Geertz was not interested in turning hermeneutics into a “para science”. Rather, he emphasized on actual interpretations – efforts to draw insights about how meaning operates in social life (Geertz, 2000, p. 5). Drawing on this approach, I aim to explore how the Chakma community attribute meaning to climate change and how these meanings shape their adaptation strategies. Just as the Balinese cockfight revealed deeper meaning about social life, Chakma narratives about nature and spirits embed environmental knowledge, historical memory, and socio-political concerns. During my fieldwork, I often heard people using metaphors and memories to describe climate change. At first, I struggled with how to analyse such responses. Geertz's works helped me realize that these statements are not just metaphors; they are interpretive frameworks that shape their reality. It helps me to study the layers of meaning rooted in their oral histories, rituals practices, and storytelling.

Johannes Fabian (2001) contributed to this discussion further. In *Interpretation in Anthropology*, he highlighted the importance of interpretation as a methodological and philosophical foundation for anthropological research (Fabian, 2001). Fabian demonstrated how anthropology inherits both scientific rationalism and humanistic hermeneutics by tying interpretive anthropology to its philosophical heritage. He argued that rather than being a discipline that has to choose between two traditions, anthropology could be viewed as a dialogue between them (Fabian, 2001). This viewpoint is especially relevant to my research because it promotes an examination of indigenous peoples' perceptions of the climate that goes beyond simple scientific observation or solely symbolic discourse. Fabian (2001) also highlighted the fact that despite its theoretical significance, interpretive anthropology has had difficulty establishing a unique methodology. Although Geertz's “thick description” offers a useful analytical lens, interpretation is still mostly improvised and depends on the anthropologist's capacity to identify “webs of significance” rather than adhering to a precise methodological framework (Fabian, 2001, p. 642). He asserted that anthropology is an act of interpretation in and of itself, one that necessitates reflection and recognition of the researcher's function in meaning-making (Fabian, 2001, p. 643). This perspective guided me to critically engage with the representation of the Chakma’s climate knowledge. Also, it draws attention to the difficulties of representing indigenous perception with both contextual sensitivity and analytical depth.

I also employ Environmental Hermeneutics of Utsler et al. (2014). In *Interpreting Nature: The Emerging Field of Environmental Hermeneutics*, Utsler et al. (2014) argued that Environmental Hermeneutics provides an engaging framework to analyse how societies understand and give meaning to

environmental changes. Having its root in philosophical hermeneutics, this perspective questioned the idea that environmental knowledge is made up only of objective facts. Instead, it emphasized how interpretation, historical context, and cultural frameworks mediate environmental encounters (Utsler et al., 2014). A key principle of environmental hermeneutics is that there is no unmediated interaction with nature. Illustrating Nietzsche's claim that "there are no facts, only interpretations", they asserted that even scientific facts about the environment must be viewed through the lens of human meaning-making process (Utsler et al., 2014, p. 1). This approach agreed that environments are not static entities but relational constructs that emerge through human interactions, interpretations, and traditional practices (Utsler et al., 2014). This framing is critical to understand how the Chakma compare past and present climate circumstances, associating changes to larger cosmological and moral ordering rather than simple scientific causality. Environmental hermeneutics, as the authors positioned, is a conversation across many knowledge traditions that bridges philosophical, scientific, and indigenous viewpoints. Elaborating environmental hermeneutics as "a number of overlapping possibilities and approaches", they stressed on understanding it not merely as a tool for interpreting nature, but as a "philosophical approach" that sees meaning making as a condition of being human (Utsler et al., 2014, pp. 3-4). Referring to Gadamer, they further argued that people understand the world through their historical, cultural and ontological frameworks (Utsler et al., 2014, p. 4). Also, they underlined that interpretation happens on several levels, including through policy discourses, cultural narratives, and firsthand experience (Utsler et al. 2014). This framework of Environmental Hermeneutics is in line with my research, when focusing on how the Chakma integrate economic realities and spiritual beliefs into their environmental understandings through an ongoing dialogue between their embodied ecological knowledge and evolving climate discourses. Moreover, I can unpack the complex meanings embedded in their climate perceptions, showing how historical dispossession, changing livelihoods and interaction with state-led development initiatives influence how they perceive and respond to environmental changes.

I further employ Paul Ricœur (2004), whose work on narrative and historical memory guided the analysis of how the Chakma compare past and present climate experiences. In his philosophical work, *Memory, History, Forgetting* (2004), Ricœur explored how past is remembered, how history is written and how forgetting plays a role in shaping both personal and collective memories. In his discussion of how memory is exercised, he explained memory into two dimensions: i. Cognitive memory; & ii. Pragmatic memory (Ricœur, 2004, pp. 56-58). Cognitive memory, he argued, acts like a mental representation, it stores information about past events. Ricœur (2004) emphasized that this kind of memory is directed towards truth. But it is not perfect. It is fragile, can be distorted, and is prone to

false memories. In contrast, pragmatic memory focuses on how memory functions in everyday life. It is not just about what happened, but why it matters now. In this sense, pragmatic memory connects the past to the present and guides moral and social actions. He further distinguished "remembering" (Ricœur, 2004, p. 58) from memorizing where remembering is about recognizing something from the past. It is spontaneous and personal. Memorizing, on the other hand, involves something mechanical, like storing certain historical facts to recall later. It risks becoming detached from meaning. I use more of Ricœur's framework of remembering to examine how the past memories of climatic and environmental factors help the community people to frame their contemporary realities. I used remembering not as facts but as way of interpretation. He argued that historical events do not exist in isolation; they are remembered and retold through the lens of cultural and personal narratives (Ricœur, 2004). During my fieldwork, I noticed that the Chakma individuals, older people in particular, often compare current environmental transformations to past climate experiences. His work guided me to see that when they talk about climate events, they do not simply describe what is happening now; they draw on past and present experiences to make sense of today's climate shifts in historical context.

Ricœur (2004) also explored the tension and interrelation between personal memory (how individuals remember) and collective memory (how groups or societies remember). He argued that though all memories start in individual mind, personal memory is connected to social context. Drawing on Maurice Halbwachs, Ricœur stated that in reality, people are never alone in their memory (2004, pp. 120-121). People remember within the framework of a group – family, community, nation, etc. Thus, memory is shared but not unified; attention to conflicting narratives is crucial (Ricœur, 2004). This framing helped me understand how memory is selective and shaped by cultural values. Not every past climate event was remembered or narrated in the same way. This reminded me that climate perception is never just about what has happened; it is about what is remembered, emphasized, and framed as meaningful in specific context.

Anthropology of Climate Change: Engaging with Crate and Nuttall's Insights on Climate Change and Indigenous Communities

To contextualize my research, I make extensive use of the theoretical and conceptual insights offered by Susan A. Crate and Mark Nuttall in *Anthropology and Climate Change: From Encounters to Actions* (2009). Their research offered a framework for comprehending climate change as a cultural phenomenon, with a focus on how it affects indigenous populations. Their research highlighted the necessity of anthropological perspectives in understanding both local and global dimensions of climate

change, especially its impacts on indigenous and location-specific populations. They showed that indigenous and local peoples worldwide are already witnessing and feeling the effects of climate change and sharing compelling narratives of such experience (Crate & Nuttall, 2009). For these people, climate change is "lived reality" that they find difficult to "apprehend, negotiate and respond to", a deeply cultural issue intertwined with local knowledge and socio-cultural and political realities; not something that might happen in the near of distant future (Crate & Nuttall, 2009, p. 9). They further questioned the prevailing narrative that often presents it as a global environmental concern detached from local circumstances and personal experiences (Crate & Nuttall, 2009). This viewpoint enables me to critically engage with the Chakma's lived experiences and their responses within their context.

Multi-Level Analysis of Perception

Contributing to the same volume (Anthropology and Climate Change: From Encounters to Actions, Crate & Nuttall, 2009), Roncoli et al. (2009) through their work *Fielding Climate Change in Cultural Anthropology*, proposed a multi-level analytical framework of interpretation for climate-culture interactions. This framework included four "overlapping axioms" of interpretation that highlights culture's interaction with climate change: "perception (how people perceive climate change through cultural lenses; knowledge (how people comprehend what they see based on their mental models and social locations); valuation (how they give value to what they know in terms of shared meanings; and response (how they respond, individually and collectively, on the basis of these meanings and values" (Roncoli et al., 2009, p. 88). I have considered this approach as it enables a comprehensive examination of the Chakma's experiences:

1. Perception: How do the Chakma interpret climate change, and how do these interpretations correspond with or differ from scientific perspectives?
2. Knowledge: What traditional ecological knowledge (TEK) does the Chakma hold, and how does it shape their interpretation of climate change? This includes the examination of their social memory and the intergenerational transfer of environmental knowledge.
3. Valuation: In what ways do the Chakma value their environment, and what cultural, spiritual, or economic significance do they ascribe to it?
4. Response: What adaptation methods have the Chakma developed to respond to changing environments?

Social Memory in Climate Perception

Crate and Nuttall (2009) further emphasized that a crucial element of perception is the role of social memory on how societies comprehend and react to environmental shifts. Social memory, as

articulated by McIntosh, Tainter, and McIntosh (2000, referenced in Crate & Nuttall, 2009, p. 17), refers to the "long-term communal understanding of landscape and biocultural dynamics that preserve pertinent experience and intergenerational transmission; the source of metaphors, symbols, legends and attitudes that crystallize social action." The analysis of social memory, they continued, clarifies how communities "curated" and communicated historical environmental conditions and responded to them, and thereby can inform the present (Crate & Nuttall, 2009, p. 17). The editors encouraged economists and policymakers to pay close attention to how social memory works, especially when analyzing climate change. They mentioned two reasons regarding why social memory matters: i. For the integration of small-scall farmers and producers' traditional knowledge in policy discussion. These people rely directly on nature and usually the ones hit hardest by climate change. Yet, their voices are usually not heard, and their needs are not considered in macro-level policy decisions. ii. for conservation of indigenous cultures, wisdom, knowledge and experiences. Their knowledge system and wisdom can be used as vital resource for adaptation strategies that are culturally meaningful and informed by local needs (Crate & Nuttall, 2009, pp. 17-18). Protecting this memory is also important for protecting indigenous identity. This way of understanding climate change from the lens of social memory is important to my study. The Chakma's traditional knowledge, oral histories, and cultural practices are embedded in their social memory. These influence their interpretation and response to environmental changes.

Vulnerability: Intersecting Stressors and Marginalization

I use Crate & Nuttall's (2009) concept of climate change as a "threat multiplier" to analyze the impacts and vulnerabilities of the Chakma community (Crate & Nuttall, 2009, p. 11). This framework showed how climate change "magnifies" and exacerbates existing socio-economic, political, cultural and environmental challenges deepening indigenous peoples and other place-based populations' vulnerabilities (Crate & Nuttall, 2009, p. 11). They argued that climate change does not come in isolation; it intensifies pre-existing issues such as "poverty, deterritoriality, marginalization, and non-inclusion in policy making process and discourses" (Crate & Nuttall, 2009, p. 12). The disruption of ecosystems such as changes in forest resources, fisheries, and agricultural productivity directly impacts their customary use of culturally and economically significant species. This damages both their livelihoods and cultural practices. These disruptions are cultural as well because it affects the human-environment relationships that ground indigenous worldviews and sustain their connection to local landscape. Such disruption and changes in landscape, further impact peoples' 'sense of home and place' (Crate & Nuttall, 2009, p. 13). The land is not just a physical space for the indigenous and other place-based communities but a repository of cultural meaning, wisdom, and spiritual significance. The

loss of place due to climate-induced changes could lead to “disorientation, alienation, and loss of wisdom of the physical make-up of cosmologies and worldviews, and human-environment interactions that are a culture’s core” (Netting, 1968, 1993; Steward 1955; cited in Crate & Nuttalll, 2009, p. 13). Crate and Nuttall (2009) further argued that climate change also poses a risk to the plants and animals essential for subsistence practices, annual cycles, and sacred cosmologies. The loss of culturally significant species may lead to the erosion of “mythological symbols, meteorological orientations and even the very totem and mainstay plants and animals that ground a culture” (Crate and Nuttall 2009, p. 12).

By analyzing climate change as a “threat multiplier,” I intend to examine multifaceted impacts of climate change on the Chakma and its role in intensifying their structural vulnerabilities including poverty, lack of control over their land, and socio-political marginalization.

Adaptation and Resilience

I further employ Crate and Nuttall’s (2009) approach to analyze the Chakma’s indigenous adaptation practices. Following them, I argue that adaptation to climate change is a complicated, culturally embedded process that goes beyond just being resilient and able to adapt. Even though resilience - both social and biological - is important for sustaining livelihoods and utilizing resources, Crate and Nuttall questioned if these systems are enough to deal with huge changes in the environment and culture (2009, pp. 9–10). They argued that adaptation is more than just coping with short-term changes in the environment. It also means tackling the deeper cultural, ethical, and institutional barriers that make it hard for communities to respond effectively (Crate & Nuttall, 2009, p. 10). To them, adaptation encompasses not only the management of environmental changes but also the preservation of cultural identity and the ties between humans and their environment (Crate & Nuttall, 2009, p. 12). This point of view is very important to my research because it pushes me to think beyond simple ideas of resilience and instead investigate how structural inequality, socio-economic marginalization, and cultural disintegration affect peoples’ adaptive capacity.

Moreover, Crate and Nuttall (2009) emphasized the significance of incorporating traditional ecological knowledge (TEK) and practices into global efforts to climate adaption strategies. They argued that indigenous communities have a wealth of traditional knowledge and innovative practices that can contribute to climate change adaptation and resilience. This insight corresponds with my objective of prioritizing the Chakma's traditional knowledge and practices in my study, acknowledging their capacity to contribute to culturally sustainable adaptation solutions. Applying this lens, I investigate

how the Chakma community's traditional agricultural practices, forest management, and community networks contribute to their resilience while also reflecting their cultural aspects.

Negotiated Modernity and Indigenous Adaptation

I use the term "negotiated modernity" to describe the Chakma's adaptation practices in response to climatic and other transformations. I use it not as a theorized concept by any single scholar, but as an interpretive lens informed by a range of anthropological works.

After World War II, traditional modernization theory held that "traditional" societies, "backward nations," and poorer countries were just at a "beginning stage" of development and would naturally "catch up" with wealthier nations over time (Ferguson, 2006). In *Global Shadows: Africa in the Neoliberal World Order*, James Ferguson criticized this "teleological" approach (Ferguson, 2006, pp. 176-178). Drawing from his study in postcolonial Africa, Ferguson claims that modernization has increased divergence and exclusion. Many African societies have not simply lagged behind but have become structurally marginalized in the global economy, with no realistic prospect of catching up. He explains this as the "decomposition" of modernity with two parts: i) cultural pluralism or "alternative modernities" that emphasizes diversity and celebrates alternative ways of living; ii) A political-economic modernity that highlights fixed global inequalities and a world where regions like Africa are no longer seen as temporarily behind but fundamentally excluded from global prosperity (Ferguson, 2006, pp. 176-178). Ferguson (2006) criticized anthropologists for celebrating "alternative modernities" while ignoring global material inequality.

Building on this understanding, I employ negotiated modernity as an analytical framework, particularly to analyze indigenous adaptation practices. Negotiated modernity, here, refers to the process by which indigenous and marginalized communities selectively engage with modern institutions, technologies, and cultural flows, adapting them according to local needs, histories, and constraints. Instead of tradition versus modernity, it sees adaptation as a dynamic, plural and uneven negotiation driven by historical inequalities, local context and aspirations.

Anna Tsing's *Friction: An Ethnography of Global Connection* (2005) supports negotiated modernity. From her work with indigenous communities and logging industries in Indonesia, Tsing illustrated that global pressures intersect local histories and "frictions: awkward, unequal, unstable, and creative qualities of interconnection across difference" (Tsing, 2005, p. 4). Local actors do not simply accept or reject external forces but creatively and selectively engage with them. Local practices change

due to these frictions, suggesting modernity is negotiated through situated interactions. Communities actively negotiate their participation in globalization and development. Her analysis emphasized the necessity of viewing adaptation as a dynamic negotiation of power, opportunity, and constraint (Tsing, 2005).

Similarly, Tania Murray Li's *The Will to Improve: Governmentality, Development, and the Practice of Politics* (2007), examined Indonesia's highland communities' participation in development projects initiated by the state and international organizations. Instead of wholly resisting or uniformly accepting these programs, they negotiate them. They incorporate new practises, sometimes reworking them to suit local conditions and sometimes subtly undermine them. Her work demonstrated that adaptation under unequal condition is always political, shaped by marginalization and local aspirations (Li, 2007).

Arjun Appadurai's *Modernity at Large: Cultural Dimensions of Globalization* (1996) further enriches this conceptual framing. He emphasized that modernity is not confined to the West but is produced and localized in various ways across different societies. Appadurai argues that global cultural fluxes create diverse, localized modernities through "ethnoscapes" and "ideoscapes" (Appadurai, 1996, pp. 33–38). He framed modernity as a localized and imaginative process where migration, media, and the global circulation of ideas allow local actors to reinterpret and adapt global concepts to their own cultural narratives and social systems.

From these approaches, this thesis conceptualizes adaptation as negotiated modernity. Adaptation is understood not as a linear transition from tradition to modernity, nor as an inevitable reaction to environmental change, but as a selective, situated, and dynamic interaction with multiple pressures - climatic, socio-economic, political, and cultural. This negotiation shows the Chakma's agency and structural constraints they navigate.

Indigenous Peoples: Identity and Agency

Indigenous peoples worldwide are labelled by different terms that reflect distinct historical, cultural, and political settings. In Thailand, for instance, they are referred to as "Hill Tribes," in Vietnam as "Ethnic Minorities," in China as "Minority Nationalities," in India as "Scheduled Tribes," and in the Philippines as "Cultural Communities" (Singh, 1980; Asia Indigenous Peoples Pact, 2014; cited in Islam et al., 2022, p. 3). The 2010 legislation in Bangladesh classifies them as "small ethnic groups, ethnic sects, and communities," (Islam et al., 2021, cited in Islam et al., 2022, p. 3). Islam et al. (2022) asserted

that terms such as “indigenous people,” “small ethnic groups,” or “ethnic minorities” typically refer to populations residing in mountainous, hilly, forested, and plain regions (Islam et al., 2022, p. 3). Their lifestyles, cultural practices, and economic activities are distinct from the mainstream. Economically, small ethnic societies operate outside the mainstream economy. Their economic activities are reliant on subsistence rather than capitalist monetary systems (Islam et al. 2021; cited in Islam et al., 2022, p. 3). Islam et al. (2022) indicated that indigenous groups in Bangladesh embody historical and original traditions, maintaining their cultural distinctiveness despite various historical and social changes. Their argument is consistent with previous viewpoints that highlighted the importance of preserving cultural traditions within indigenous societies, framing them as guardians of “ancient” lifestyles (Civallero, 2007; Kleymeyer, 1993; Van Nieuwkoop & Uquillas, 2000; cited in Islam et al., 2022, p. 3). While it is undeniable that indigenous people maintain distinct cultural practices; this perspective may inadvertently essentialize them as mere remnants of history, rather than recognizing them as active communities that continuously negotiate their identities in relation to modernity.

As I engage with the complexities of indigenous identity and agency, I find it crucial to move beyond the simplistic dichotomy of tradition vs. modernity. Indigenous communities are dynamic entities. They actively engage with evolving political, economic, and environmental conditions. Their interaction with emerging technologies, and economic transformations indicates a deliberate process of adaptation that enables them to redefine their position within modern socio-political contexts. This viewpoint enables me to conceptualize how the Chakma deal with socio-political transformation, integrating contemporary adaption ways while maintaining their cultural structures. I argue that indigenous knowledge and governance systems should be regarded not as relics of the past, but as dynamic and changing frameworks that engage with modern circumstances. Acknowledging this agency facilitates a more sophisticated approach to climate adaptation, resilience, and socio-political negotiation, positioning indigeneity not as opposition to change, but as a continuous, purposeful process of cultural and environmental interaction.

Islam et al. (2022) though recognized that indigenous peoples have adjusted to changing technological and cultural landscapes; however, they asserted that these communities largely exist outside of capitalist economic systems and continue to preserve a unique identity distinct from the national mainstream (Islam et al. 2022, p. 3). Nonetheless, this viewpoint may inadvertently strengthen a false separation between indigenous and non-indigenous realities, neglecting the intricate connections that define modern indigenous lives. In my research, I aim to challenge this dichotomy by emphasizing that indigenous adaptation is not about resisting change but rather about actively shaping it. This positions

indigenous peoples not as marginal to modernity but as key participants in redefining the terms of engagement with the state, market, and environmental governance.

Environmental Anthropology: Nature, Culture and Indigenous Knowledge

Anthropology of the environment, or environmental anthropology, "is a specialization within the field of anthropology that studies current and historic human-environment interactions" (Kopnina & Shoreman-Ouimet, 2011, p. 1; Kopnina & Shoreman-Ouimet, 2013, p. 1). While the terms 'environmental anthropology' and 'ecological anthropology' are often used interchangeably, there exists a conceptual distinction between them. They argued that many scholars considered environmental anthropology as the "applied dimension of ecological anthropology, which encompasses broad topics including cultural ecology, ethnoecology, historical ecology, political ecology, spiritual ecology, historical ecology, and human behavioral ecology" (Kopnina & Shoreman-Ouimet, 2011, p. 1; Kopnina & Shoreman-Ouimet, 2013, p. 1). They emphasized on the solutions-oriented aspects of environmental anthropology. Referring Kottak (2010, cited in Kopnina & Shoreman-Ouimet, 2013, p. 2), they emphasized that today's environmental anthropology has an end goal; it "attempts not only to understand but also to find solutions to environmental problems."

Dove and Carpenter in *Environmental Anthropology: A Historical Reader* (2008), presented a critical reconfiguration in the study of the environment and human society. Instead of examining how diverse environments influence societies, they emphasized for a reverse investigation: how human activities, over time, affect, alter, and often degrade the environment (Dove & Carpenter, 2008, p. 2). This analytical inversion marks a major shift in environmental anthropology – from seeing nature as something that shapes culture, to understanding that people also shape the environment through their actions.

Dove and Carpenter asserted that environmental anthropology "sits astride the dichotomy between nature and culture" (Dove & Carpenter, 2008, p. 2). They continued that environmental anthropologists have always questioned this dichotomy and continue to do so. Drawing on the works of Darrell Posey and James Fairhead and Melissa Leach (cited in Dove & Carpenter, 2008), they illustrated environmental anthropology's position to this dichotomy. Both Posey, and Fairhead and Leach (cited in Dove & Carpenter, 2008) questioned nature-culture dichotomy studying indigenous perception and knowledge systems that recognize ecosystems as interconnected communities rather than isolated species. Posey's research among the Kayapó Indians of the Brazilian Amazon on indigenous management of tropical forest ecosystems underscored the importance of "immersion in

emic knowledge" to understand local practices in environmental management (cited in Dove & Carpenter, 2008, p. 3). Posey argued that "indigenous peoples should be seen as models for conservation, rather than as opposed to it" (cited in Dove & Carpenter, 2008, p. 5). Fairhead & Leach (cited in Dove & Carpenter, 2008, p. 5), on the other hand, critique the political dimensions of knowledge production, showing how local land-use practices are often misrepresented in state-led conservation efforts. They challenged environmental discourse's colonial and policy-driven "vision of degradation" that misinterpret local land use (cited in Dove & Carpenter, 2008, p. 5). Fairhead & Leach claimed that French colonialists and Guineans misunderstood forest islands as remains of old forests destroyed by local activities while indigenous management actively shaped and nurtured these environments (cited in Dove & Carpenter, 2008, p. 5). Their findings revealed conservation as a political process, rather than solely an ecological one, where conflicting knowledge systems influence policy decisions (Fairhead & Leach, cited in Dove & Carpenter, 2008). Furthermore, Fairhead and Leach (cited in Dove & Carpenter, 2008) expanded Posey's claim that indigenous knowledge promotes conservation, highlighting that conservation is never neutral, but rather a political decision about which landscapes and behaviours are valued. Their work illustrated how scientific and policy frameworks frequently disguise the power dynamics implicit in environmental decision-making, sustaining global disparities in resource management (Fairhead & Leach, cited in Dove & Carpenter, 2008). These insights are crucial for understanding how the Chakma community's traditional knowledge and practices might be marginalized or misrepresented in broader climate change discourses.

Drawing on Posey and Fairhead & Leach's work, Dove and Carpenter (2008) asserted that nature and culture are intricately linked. They pointed that, despite being ever-present in human-environment interactions and lacking a precise phrase for characterization, this overlap is conceptually complicated and often challenging to identify (Dove & Carpenter, 2008).

Chapter Outline

I present this thesis into six chapters. In this first chapter (introduction), I have discussed the background, research objectives, and the broader context of climate change and indigenous communities, with a focus on the Chakma community of Dighinala in the CHTs, Bangladesh. I have also outlined the theoretical and conceptual frameworks. The immediate next chapter (chapter 2) provides an overview of the methods, study area and community, and ethical considerations.

In the next three chapters (chapter 3, 4 & 5), I will present three key themes of this thesis – perception and interpretation, impacts and vulnerabilities, and indigenous adaptation practices. Though in reality, all three are connected and the community people never separated them while we spoke, I separate them for analytical purposes. This categorical presentation enhances clarity of my thesis's structure.

Chapter three will detail the Chakma's perception and interpretation of climate change. Based on interpretive anthropology, environmental hermeneutics, and memory frameworks, it will show how personal memories, communal narratives, moral cosmologies, and their situated experiences of socio-economic change shape their understanding. Here, I organise their narratives into three analytical arguments. First, I explore how the Chakma perceive environmental changes through a temporal lens, contrasting the present with memories of the past — what they describe as a time of *shwabhabik* (normalcy). Second, I examine their moral and cosmological interpretations of change, where human actions and spiritual forces are seen as shaping environmental outcomes. Third, I discuss how they interpret environmental changes in connection with broader socio-economic transformations, including state interventions, market dynamics, and demographic shifts.

Chapter four is about climate change and other socio-economic transformations' impact on the community and resulted vulnerabilities. It will explore the observable effects on everyday lives particularly in relation to work, land, livelihoods, health, rituals, and communal relationships. The analysis is about: what types of vulnerabilities have emerged or intensified; and who is impacted and how. Following Crate & Nuttal (2009), this chapter will analyze climate change as a "threat multiplier" and illustrate how environmental changes can intensify preexisting vulnerabilities.

Chapter 5 will draw on the adaptation practices of the Chakma community with a focus on how they navigate these changes using their cultural knowledge and practical experiences. Being inspired by the work of Tsing (2005), Li (2007), and Appadurai (1996)), this chapter will analyze the community's adaptation practices through "negotiated modernity" as an analytical framework. It will highlight the community's agency focusing on their selective engagement with new agricultural practices, livelihood options, migration, and modern influences to navigate shifting environmental and socio-economic conditions. Instead of tradition versus modernity, it will argue adaptation as a dynamic, plural and uneven negotiation driven by historical inequalities, local context and aspirations.

Finally, chapter six concludes the thesis by synthesizing the findings, discussing the contributions to anthropology and climate change studies, and suggesting directions for future research and policy engagement.

Chapter 2: Methods, People, Place, and Ethics

Methods

My research entailed a 5-month fieldwork in Dighinala, Khagrachhari between July and November 2023, during the heavy and humid months of the year in Bangladesh. Following Roncoli et al., I did ethnographic fieldwork – an approach of "being there" - to understand how the Chakma perceive and respond to climate change (Roncoli et al., 2009, pp. 88-90).

Making an Entry in the Field

Getting into the field is never simple. As Bernard (2011) reminded me, entering a field site is often one of the most challenging aspects of ethnographic fieldwork. For my study, this process started long before I even stepped foot in Dighinala. Using my connections with my former coworkers, I got introduced with a UN volunteer from the Chakma community in Khagrachhari, who helped me to find my local assistant from Dighinala. This person, my local assistant – I call him Keton Chakma, was fluent in both Chakma and Bengali language. He had relocated to Khagrachhari town for work and his children's education. He became an invaluable resource for my research serving both as a language translator and a mediator of trust, knowledge, and culture. I also used my family networks to arrange accommodation in Khagrachhari.

I rented a two-room apartment in Khagrachhari town which was supposed to be ready when I arrive. But it was still under construction, and I had to stay at a local hotel for the first few days. Though frustrating, those unanticipated days in Khagrachhari town turned into an unforeseen site of observation. I saw how Chakma migrants from rural areas dealt with urban life, how marketplaces operated, and how people discussed the stresses of land, development, and environmental changes. The town itself became a part of my learning process.

I dedicated the first week of my fieldwork to identify potential field sites. I visited two neighbouring areas and selected Banchara area of Dighinala as my primary field site. My initial findings, primarily on population density and accessibility influenced this choice. My ethnographic journey officially began at this point.

Gaining Acceptance in the Community

Being physically present was not enough to enter the community; rapport, trust, and knowledge of local power dynamics were all necessary. To achieve these, I had meetings with important local leaders, such as the Chairman and a female member of the Dighinala Union Parishad (UP)[1]. I also spoke with Karbaris[2], who are in charge of individual para[3]. These meetings were more than just formalities; they were an essential part of my presence-building process, my understanding of local leadership dynamics, and my quest for wider community acceptance. I initially was met with skepticism. The Chakma people had every reason to be cautious - why was a Bengali woman so interested in their lives? Was I with the government? Was I here on behalf of an NGO? What would I do with their information? These were questions that hung in the air, unsaid but tangible. I was aware that trust had to be gradually gained over time and could not be demanded.

Participant Observation

I used participant observation as one of my key data collection methods. I had to go beyond planned questioning and become fully immersed in the community's daily life to comprehend how they view, feel, and adjust to climate change. As Bernard asserted that participant observation is about "getting close to people and making them feel comfortable enough with the presence of the researcher so that one can observe and record information about their lives" (Bernard, 2011, p. 1). I embraced this approach, putting myself in the role of a participant observer, taking part in everyday activities while keeping an eye on things. I shared some details of my life, including how I began my day, what I ate, my experience in Norway—a foreign country—and my struggles adjusting to the new environment, to establish rapport. Over time, this strategy fostered a space for warm everyday talk encouraging community members to share details about their personal lives, routines, and viewpoints.

I participated in different ways. I accompanied farmers into their fields to observe how they read the earth, measured soil fertility, and evaluated temperature and precipitation variations. I gained knowledge of both conventional and contemporary farming methods. I observed Chakma women negotiating over vegetables, talking with them about their produces, growing food prices, and evolving trade patterns while I sat in the local marketplaces and interacted with them as they sold Pahari vegetables, grains, and handicrafts. I participated in the tea stall discussions, where I saw people talking about topics such as forest conditions, plantation and conservation policies, weather patterns, and recent transformation and so on. I also observed personally how environmental change

[1] Union Parishad (UP) is the lowest administrative tier of the local government in Bangladesh.

[2] Community leader who are in-charge-of the para.

[3] Small settlements in the hill tracts made up of 25–60 families, also called villages by the local administration

affects families' daily survival as I walked with them while they gathered firewood or searched for food in the forest. In addition to offering useful data, these activities helped me better understand how the community interacts with its surroundings and how people are adapting to changes.

However, ethnography also examines people's actions in addition to their words. I saw how households prepared a tiny plot of land for cultivation, prepared for severe weather, and relied on and maintained communal networks to survive during emergencies. Rich, embodied data was obtained from these observational moments.

Interviews and Group Discussions

I conducted interviews and group discussions with the community members, but these were never rigid or overly structured. I conducted in-depth interviews with people across different generations and gender, including middle-aged farmers grappling with contemporary issues, young people torn between the opportunities of the town and the pull of the village, and elders recalling childhood memories of a landscape that no longer existed. Elders I sat with recalled a time when the forests were denser, and the rivers and streams were fuller. They spoke with a mixture of concern and nostalgia. The worries of the younger generation were different. They talked about migration, getting a job, and whether their kids would still be able to speak Chakma language. These discussions often developed naturally, influenced by the setting in which they took place—a quiet afternoon in a courtyard, a lunch break from the agricultural field under a fruit tree, a discussion cut short by the start of monsoon rains. Power cuts were common, and household discussions often unfolded while family members fanned themselves. Most of the interactions were accompanied by acts of hospitality - tea, fruits, or local snacks offered as we talked - and infused with the sounds and textures of rural life, from the rustle of leaves to the songs of elders played on a harmonium. I used an interview guide that contained broad thematic questions related to climate change, its impact, their vulnerabilities and local adaptation practices. Following Skinner, I let the discussions unfold organically, instead of rigorously adhering to a predetermined list of questions (Skinner, 2012). I added follow-up inquiries in relation to the answers I got.

Similarly, I spoke to the locals in small groups. These discussions were usually conducted in various informal settings often in open spaces chosen by the participants where they felt comfortable - airy courtyards, roadside benches, under the shade of trees, in crowded local bazaars (markets), at local tea stalls, beside ponds and riverbanks. To gather gendered and generational perspectives, I engaged with both men and women, young people and elders from different professions and backgrounds. I

maintained both handwritten notes and audio recordings (upon consent); this allowed me to listen more actively and document what the community members said in more detail.

In many of these interactions, I was not just a researcher but also an interlocutor and a listener who sought to understand the reasons behind people's statements and the ways their narratives influenced their adaptation strategies. Their pauses, sighs, and the way their eyes lit up while discussing a certain memory were all non-verbal clues that I took note of in addition to their spoken remarks. Also, I collected life stories by asking people to reminisce about their childhood, explain how their surroundings as well as different practices had changed, and to reflect on what they believed lay ahead. Every story told was at once deeply personal and a part of the shared experience of navigating social and environmental changes. Importantly, what I got from the interviews and group discussions, particularly about the past, is a representation of the past, not a one-to-one account of the past as it really was. Rather a representation of how people think about the past in the present.

Area Walks

Some of my most insightful data came from walking through the landscape with the people who knew it best. I was able to see, hear, and feel the changes that the community was talking about; thanks to these area walks, which gave me an embodied awareness of the surroundings. I was invited to accompany farmers to the fields and orchards, where they would point to fields, they once grew rice but could no longer do so due to soil degradation and changed soil texture, how certain water sources had dried up or shifted path, and how pest infestations had become more unpredictable over the years. Some walks were spontaneous, sparked by a discussion about a freshly built road or deforestation. Others were planned, in which community members showed me certain sites with ecological or cultural significance. Sudden rainstorms often interrupted our discussions, forcing us to take shelter inside house or at roadside stalls. In addition to visiting the location and collecting information, these narrative-driven walks allowed me to observe and feel the shifting landscape firsthand. Memories surfaced as we walked. They talked about areas that their ancestors farmed, forests where they gathered medicinal plants, and water bodies that used to be streaming with fish. Their words brought the terrain to life, turning it from a piece of land into a living history of adaptation, transformation, and resilience.

Travel as an Ethnographic Method

The way travel itself evolved into a data collection method was one of the most surprising but crucial elements of my research. Because of the hilly terrain and the remoteness of the paras, having a

reliable means of transportation was essential for me. Walking was not feasible, and public transportation was not an option either. Consequently, I chose motorbike travel. Keton Chakma and I used a motorbike to travel to the paras every day. What began as a logistical necessity to reach my field sites, quickly turned into an ethnographic lens in and of itself. The trips across hilly terrain without mobile network connectivity were an excellent opportunity for self-reflexion and observation. The road turned into a site of exploration, providing insights into land use patterns, environmental change, and the tangible effects of climate vulnerability. The motorbike rides became a space of conversation as we went along; I found myself asking spontaneous questions, sparked by the landscape itself. Talks regarding changing agricultural methods were prompted by a burned jhum field; a dried-up water source inspired reflections on water scarcity; and talks on social mobility, urban influence, and economic transformation were sparked by a recently constructed concrete house or under-construction roads. These were free-flowing discussions that were influenced by our surroundings. These conversations mirrored what Arve Hansen described as “motorbike ethnography” while doing his fieldwork in Hanoi (Hansen, 2018, p. 8).

The everyday journeys provided spontaneous moments for interaction and learning. These “on-the-road ethnographies” meant that I was continuously absorbing information outside of face-to-face interactions. I observed where new highways were dividing through the hills, how marketplaces operated at different hours, and which sections had just been cleared of trees. What I observed during the rides also helped me to bring in new and diverse topics to my interaction with the community people.

Notably, sudden rainstorms often stopped our journey, forcing us to take shelter in roadside stalls or switch from motorcycle to *tomtom* (local three-wheeler) to continue travelling, even left me soaked on my way home. These interruptions echoed the unpredictability that community members described in their accounts, making my own experience of fieldwork a small reflection of their daily reality.

If I had spent more time in one para, would my research have been easier? Perhaps. But then I would have missed the broader, interconnected picture. If I were to give advice to future scholars doing similar ethnographic work in remote areas, I would say to embrace travel as an ethnographic method in and of itself, rather than just as a need.

In addition to the above, I maintained field notes to record the subtleties of my conversations, activities, and observations. To retain visual aspects, I also took photos (I have added some at the end of this thesis).

Study Area and Community

The CHTs region covers approximately 5,093 square miles, which is about 10% of Bangladesh's total land area and 76% of the country's hilly region (Mohsin, 2022; Haque, 2000a, cited in Miah et al., 2012). It comprises three districts: Rangamati, Khagrachhari, and Bandarban. The region is known as a biocultural diversity hotspot due to its abundant natural resources and cultural diversity (Halim et al., 2007, cited in Miah et al., 2012). The CHTs share international borders with India and Myanmar. It is bordered by Tripura to the north, Mizoram to the east, and Myanmar to the southeast (Adnan, 2007).

The CHTs is home to thirteen indigenous ethnic groups including the Chakma, Marma, Tripura, and other smaller communities (Mohsin, 2022; Adnan, 2007). Together, they are commonly known as the Pahari or Hill people. In colonial texts, they were often referred to as "Hillmen" (Adnan, 2007, p. 4). They differ from the mainstream Bengali population in terms of language, religion, physical appearance, and cultural practices and have greater resemblance with the tribal populations of northeastern India and Myanmar (Adnan, 2007, p. 4). Religiously, most of the indigenous people in the CHTs are Buddhists. However, smaller numbers follow Hinduism, Christianity, or traditional animist beliefs (Adnan, 2007, p. 4).

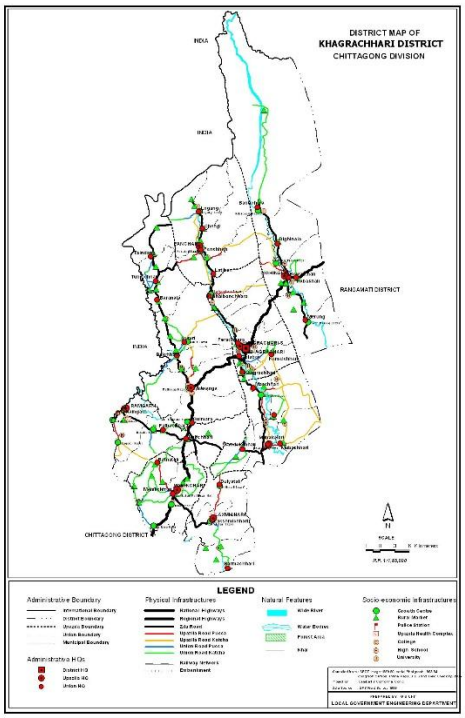
Dighinala – the Study Area

This thesis is based on my fieldwork in Dighinala Union, home to the largest Chakma population in the region, under the Dighinala Upazila (sub-district) in Khagrachhari. Dighinala's name is derived from its geographical features, specifically from the surrounding *charas* (streams) and a historical Dighi (big pond) that was excavated by the Maharaja of Tripura in the 16th century (Union Parishad, 2025). This pond and its surrounding water systems have long been vital to the Chakma's relationship with their natural environment.

Dighinala holds historical significance as a site of reconciliation as well. Following the signing of the 1997 CHT Peace Accord, members of the *Shanti Bahini*[4] (peace force) surrendered their firearms on

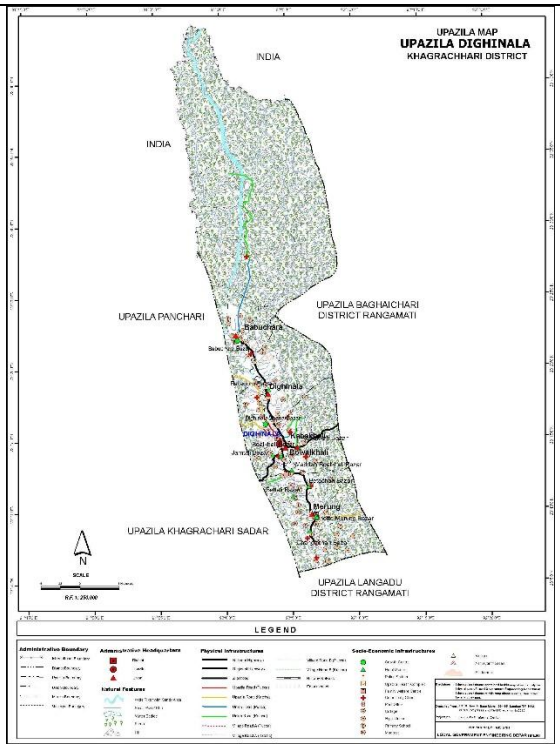
[4] Parbatya Chattagram Jana-Samhati Samiti, formed in 1973 to safeguard the interests of hill peoples. More info available at: https://en.banglapedia.org/index.php/Shanti_Bahini

the bank of the Dighi. “The Dighi is not just water, it holds memories of survival and peace; it reminds us of our struggles and hopes,” a Chakma woman in her mid-60s whose husband also fought as a member of *Shanti Bahini* shared. Dighinala, thus, is both a physical and metaphorical location for the communities living there.



Khagrachhari District

Source: Local Government Engineering Department (LGED), Bangladesh (n.d.)



Dighinala Upazila

Source: Dighinala Upazila Administration (n.d.)

Dighinala covers 56 square kilometers of rugged terrain marked with valleys, woods, and water bodies. The Union is traversed by the Maini River and four *charas*. Located 21 kilometers from Khagrachhari town, Dighinala is connected by 10 kilometers of paved roads and 45 kilometers of semi-paved routes (Union Parishad, 2025). It is accessible through the Dighinala-Babuchara Road although infrastructural limitations often hinder mobility and access to important services. Motorbikes are the best mode of transport to get around, especially the remote *paras*. As I travelled through different *paras*, it became apparent that the landscape has significant influences on the spatial structure and the community's way of life. Settlements were strategically placed along streams or on hilltops, showing a purposeful balance between access to water supplies and protection from seasonal flooding. The names of the paras - North Banchara, Middle Banchara, Right Banchara, Rangapani Chara, Banchara Murapara, and Pukurghat emphasize this close association with the landscape, with several referring directly to

charas or water features. This linguistic and spatial link demonstrates the community's long-standing interaction with their surroundings, where place names have cultural and ecological significance. These trends highlight the socio-ecological sensibility that have influenced settlement practices throughout history and now influence the community's identity. Furthermore, the absence of mobile network in certain areas reflects the area's remoteness while also preserving its distinct cultural and natural identity.

Demographic Overview

The Chakma lineage originates from the ancient kingdom of Arakan and has developed a distinct cultural identity in the CHTs (Adnan & Dastidar, 2011). According to the Union Parishad (2025) data, Dighinala has a population of 21,106 people (10,294 men and 9,812 women), the majority of whom are Chakma (20,087 people), with smaller numbers of Marma and Tripura. This ethnic composition emphasizes the dominance of the Chakma community in shaping the region's cultural and social identity. My visits to the *paras* revealed that out-migration have an impact on the population structure of the region. Families often relocate to urban areas, especially Khagrachhari town in search of better educational and economic opportunities.

Education and Literacy

Dighinala union's literacy rate is 52.40% (Union Parishad, 2025), which is significantly lower than the national average of 74% (BBS, 2022); it further comes with significant gender disparities that I observed during group discussions and casual interactions. There are 27 government primary schools and three private high schools, but no college/upper-secondary schools. Due to this lack of higher education institutions, students must travel to Khagrachhari or far. Parents expressed concerns over a lack of adequate educational facilities, which they believed limits their children's opportunities.

Social Organization

The Chakma community has a dual governance system: traditional systems and formal administrative system of the local government. Dighinala union consists of 43 *paras* (Small settlements in the hill tracts made up of 25–60 families, also known as villages by the local administration) headed by one *karbari* (community leader) for each and one headman for the union/ mouza [5]. Their social organization is centered around the *karbari* system. The *karbari* system is based on the community's

[5] Geographical expression of a unit of landmass for revenue settlement and revenue collection. More info at https://en.banglapedia.org/index.php/Mouza

traditional leadership structure where the *karbaris* settle conflicts and oversee communal activities. I visited the following *paras* during my fieldwork:

- Noapara
- Rangapani Chara
- North Pukurghat
- Middle Banchara Rasik Mohan Karbari Para
- Middle Banchara Satyajit Karbari Para
- North Banchara
- Right Banchara
- Middle Banchara
- Banchara Murapara

The entire union is served by only three government community clinics and one family welfare center. Thus, access to healthcare remains limited, particularly in remote paras due to geographical, infrastructural and economic barriers; and many rely on traditional healers for their primary care needs.

Cultural and Religious Practices

During my fieldwork, I did not witness their major celebrations firsthand. Nonetheless, the narratives and descriptions shared by the community members illustrated their cultural and religious practices. These cultural expressions function as worldviews through which individuals perceive and interpret environmental changes, understand natural cycles, and develop indigenous adaptation mechanisms. Understanding these practices were thus, critical for my research. There are 25 Buddhist temples (khyangs) in Dighinala, which act as hubs of Chakma culture and spirituality. During festivities, these temples turn into centers of social interaction. Below I elaborate on some cultural and religious practices of the community as relevant to my study.

The Biju Festival

Biju is the Chakma's New Year festival. Celebrated over three days (*phool Biju, mul Biju and Gojjepojje Din)*, Biju is one of the main festivals in their cultural calendar. The event starts on April 13-14 and coincides with the end of the Bengali calendar year (Chaitra Sankranti). It is not only a cultural celebration but also a marker of the seasonal transition – end of the dry season and the onset of rains. Community members described how, during *Phool Biju*, the first day, families clean their homes and

adorn them with flowers, symbolizing a fresh start - both physical and spiritual purification, aligning with Buddhist principles of renewal. In the evening, lamps are lit in houses and Buddhist temples, and prayers are offered to the Buddha for blessings in the next year. Mul Biju, the second day, is the heart of the celebration; it is a celebration of the community and abundance. Families make special dishes like *pajonton* (made of mixed vegetables mostly produced from jhum), *pitha* (rice cakes), and homemade drinks/*kanji* (fermented rice wine). Mul Biju, is celebrated by indulging in traditional foods. The community prays and performs rituals in Buddhist temples on the third day, Gojjepojje Din, seeking blessings for the year ahead. The Biju Dance, a devotional dance that captures the spirit of the community, marks the end of the day. To the rhythmic beats of the *dhol* (drum) and the melodic notes of the *banshi* (flute), dancers in traditional clothing (men wearing khabang (headgear) and dhuti; women wearing pinon and khadi, and silver jewellery) move in synchronized patterns. According to these accounts, Biju's adherence to agricultural cycles especially those related to the preparations of jhum cultivation, underlines the Chakma's ecological awareness, where seasonal variations are not only natural occurrences but also shifts embedded in cultural memory (Miah et al., 2012, p. 452).

Kojoi Pani Festival: Celebrating New Life and Continuity

In interviews, particularly with mothers and elder women, I learned about the Kojoi Pani Festival - a ritual performed to bless newborns. It is an ancient ceremony honouring a child's birth, exemplifies the community's values of kinship and reciprocity. Guests bring gifts of clothes, toys, and cradles, and the hosts prepare a magnificent lunch of traditional cuisine and rice wine. This celebration shows the Chakma's collective solidarity and dependence on social networks where every member plays a role in nurturing the next generation.

Kathin Chibar Dan Ceremony

Katin Chibar Dan is one of the major Buddhist ceremonies that emphasizes communal solidarity and merit-making. It is held after the monsoon retreat. During this event, devotees offer *chibar* (robes) to monks. The term *"kathin"* (difficult) signifies the ritual's demanding nature, as the entire process of making the *chibar* - from twisting yarn, weaving, cutting, sewing, dyeing, washing, drying, to its final distribution among the monks - must be completed within a strict 24-hour window, from one sunrise to the next (Fieldwork data, 2023). The *chibar* is more than fabric; it represents the interwoven threads of generosity, ethical conduct, and mindfulness - core principles of Buddhist practice. The ceremony is followed by processions, lantern lighting, and the reciting of sacred texts, demonstrating great spiritual devotion of the Chakma people. A monk clarified, "it is not just about giving robes. It is about uniting together as a community and reaffirming our dedication to the teachings of the Buddha." The

ritual includes *Sanghadan* (offerings to monks), *Ashtapariskar Dān* (offering of eight monastic requisites), and the symbolic *Kalphataru Tree Ritual*, where devotees tie threads and wishes, are all part of the ritual, which reflects both ecological symbolism and merit-making (Fieldwork data, 2023). The ceremony finishes with the lighting of *fanus* (lantern), symbolizing the dispelling of darkness and the triumph of wisdom over ignorance. The sight of hundreds of lanterns flying over the night sky is a striking reminder of the community's spiritual aspirations and their resilience in the face of adversity. This sense of communal resilience is vital, as it fosters collective action and strengthens social ties.

The Kathin Chibar Dan ceremony is more than just a religious event; it reflects the Chakma community's cultural and ecological knowledge. For example, the robes are prepared following weaving techniques that have been handed down for generations. However, the difficulties of maintaining traditional crafts in a globalized environment are highlighted by the growing availability of imported robes from Thailand and Myanmar. Additionally, the ceremony's timing which falls at the end of the monsoon season, underscores the community's understanding of ecological cycles. By aligning their religious practices with the cycles of nature, they exhibit their adaptive resilience and their capacity to incorporate ecological knowledge into their cultural practices.

Lakshmi Puja

I also learned about Laxmi Puja, a domestic ritual dedicated to Lakshmi, the goddess of prosperity. Discussions with women in different *paras* showed its significance in ensuring food security and household prosperity. This involves simple offerings of flowers, fruits, rice, and sometimes chicken, performed within the household space. According to the Chakma women, this puja is more about invoking blessings for sustenance and well-being than about elaborate rituals. This practice underscores the Chakma's agricultural ethos, where food security is both a practical need and spiritual goal.

The Noa Bhaat Ceremony: A Celebration of New Rice and Communal Gratitude

Late autumn, when the harvesting season is over, is a special time for the Chakma. It is the time when they celebrate *Noa Bhaat* - the new rice festival. As the fields turn golden with ripe rice and the harvest smell fills the air, families wait excitedly to cook and share the season's first rice. This festival represents a collective acknowledgement of the land and the spirits that enabled the harvest and the subsequent celebration. This gathering, characterized by the scent of fresh rice and traditional dishes used to bring the community together to show gratitude. It strengthened a sense of community that went beyond just survival by connecting people to the land's tangible and intangible aspects.

Alpaloni: Rest, Renewal, and the Power of Pause

The *Alpaloni* festival is a day of rest and pause. Celebrated annually, it is a time to deliberately pause from agricultural works and thank the earth. The Chakma families put away their farming tools and responsibilities in a symbolic act of rest and gratitude and celebrate the day with traditional music, dancing, and sharing *kanji*. During this celebration, both farmers and labourers come together to express gratitude for the fertility of the land, honouring spirits believed to watch over their fields and protect their families. It suspends hierarchies inviting everyone to celebrate as equal. It gives people a break from the hard work and uncertainty of their farming lives.

Tammana Puja: Satisfying the Spirits in Times

The Tammana Puja is held when the community faces extreme challenges such as drought, crop failure, or widespread diseases. This is an appeal to the spirits for comfort and prosperity. The ritual involves animal sacrifices and collective prayers performed by the community to appease the deities linked to the land and harvest. They believe that performing this ritual brings rain or safeguard their agricultural produce. This reflects a nuanced understanding of causality within the Chakma perspective.

Through my interactions and observations, I realized that the Chakma's cultural and religious practices constitute a way of life - a way to connect with the past, the land, and each other.

Challenges and Ethical Considerations

I conducted this study following the fundamental research ethics set forth by the American Anthropological Association's Statement on Ethics and Norway's National Committee for Research Ethics in the Social Sciences and the Humanities (NESH). Important considerations included obtaining informed consent, being truthful and transparent about the research, avoiding harm, and securely storing and protecting my data. The Norwegian Agency for Shared Services in Education and Research (Sikt) approved my project, attesting to the fact that data was gathered in compliance with GDPR regulations. The names and locations of my interlocutor have been anonymized, I also used pseudonyms to preserve their identity. In addition to these, I had to adopt additional ethical stances to navigate methodological and ethical challenges.

Temporal and Generational Constraints: Engaging with Elders and Youth

Residing at a considerable distance from my research site restricted my interaction with the community to daytime hours. I missed the nighttime gatherings, informal discussions, and the more relaxed, intimate encounters that typically unfold after the day's work. Although many interlocutors talked about those moments, I did not experience their nightlife firsthand.

This further limited my engagement with the youth population, as the majority were either attending school or employed outside the locality during daytime hours. Consequently, most of my interviews and group discussions involved elderly individuals. This was both a benefit and a constraint. Elders' perspectives were crucial for my research. Their capacity to analyze historical and contemporary conditions provided valuable insights into the effects of climate change on their community over time. However, the limited engagement with younger people resulted in limited generational perspectives. My interactions with youth were limited in both quantity and depth when compared to those with elders. Efforts to schedule interviews with younger participants on weekends or during school breaks resulted in minimal engagement. This gap underscores a prevalent methodological issue in ethnography: which voices are most accessible, and in what ways does participant availability influence knowledge representation? (Agar, 2008).

Navigating the Landscape: Travel, Safety, and the Limits of Mobility

Every day, I rode vast distances on a motorcycle, navigating roads that were often bumpy, lonely, and without mobile network coverage, making communication impossible once on the road. There were times when I felt uneasy, when the road ahead was empty for miles, when a sudden storm turned the dust into slippery mud, and I knew that if something went wrong, I had no immediate way to call for help. While these journeys were necessary to reach my study sites, they also included an increased sense of vulnerability as a woman and reliance on local intermediaries.

Beyond physical access, social access to communities was also determined by local power systems. I had to rely largely on Keton Chakma and the karbaris to navigate the paras and gain acceptance to the community. This reliance on local middlemen was a necessity yet limitation. While it made it easier for me to connect to the community and create trust, it also meant that my contacts were sometimes mediated by these intermediaries, which may have an impact on the dynamics of my research. The importance of gatekeepers in indigenous research settings is widely established, as they both facilitate and regulate access to community narratives (Bernard, 2011).

However, due to this dependence, my field movements and engagements were influenced in part by the priorities, views, and availability of these intermediates. There were times when certain visits had to be rescheduled because my local assistant had other obligations, or because a karbari proposed postponing a group discussion or an interview owing to local issues that I was not aware of. These intermediaries had an impact on who I met, whose stories were highlighted, and what knowledge was prioritized.

Positionality and Power Dynamics: Researching as an Outsider

My identity as a Bengali woman from a foreign university conducting research among an indigenous community, placed me in a complex positionality that encompasses both insider and outsider roles, as well as the dynamics of privilege and marginalization, authority and vulnerability. Given the political history of the CHTs, I acknowledge that my presence was not neutral; I could be perceived as an academic, an outsider, or potentially an implicit representative of the state or international institutions.

To navigate this, I consciously positioned myself as a listener rather than as an expert. I provided personal anecdotes, daily experiences, and minor details about my life, facilitating reciprocal rather than extractive conversations. As I engaged more with the people over time, participating in daily activities and learning from the community instead of imposing an external research agenda, the dynamics began to change. Nonetheless, I maintained a critical awareness that my presence could affect responses, leading individuals to potentially alter their narratives due to the involvement of an external researcher. Furthermore, following Crate and Nuttall (2009) and Fabian's (2001) suggestion, I employed a reflexive approach viewing ethics as a continuous process. As a Bengali researcher examining an indigenous community, I remained aware of the underlying power dynamics, the historical contexts influencing my presence, and the responsibility associated with lifting marginalized voices. My fieldwork involved not only the comprehension of climate change but also the examination of knowledge production, the representation of narratives, and the responsibility of researchers to ensure that their work serves the communities involved.

Confidentiality and Ethics of Representations

One ethical dilemma I encountered was the challenge of maintaining confidentiality while also preserving the depth of personal narratives. In a close-knit community, anonymization extends beyond the mere removal of names; it necessitates a thorough examination of context, relationships,

and visibility. Thus, sensitive information was either generalized or excluded to protect individual privacy.

Additionally, I had to maintain awareness regarding the ethics of representation – whose voices were prioritized, how narratives were constructed, and whose narratives were highlighted or excluded. Climate change is often examined from a scientific and policy-oriented perspective; yet, for the Chakma people, it represents a lived reality. My ethical obligation was to ensure that their views were not only acknowledged but also conveyed with integrity, avoiding both romanticization and reductionism.

Importantly, much of the data presented in this thesis reflects recollections of the past as remembered in the present. My focus was not on verifying historical accuracy, but on how these memories help the community to interpret current changes. The past, as represented in their narratives, offers a way for them to make sense of the shifts they experience today.

Ultimately, my research was not only focused on the documentation of climate change but also about engaging in a responsible and ethical way that prioritizes community agency and ensures that knowledge is co-produced, not simply extracted.

Chapter 3: Chakma Community's Perception and Interpretations of Climate Change

This chapter explores how the Chakma community of Dighinala perceives and interprets climate change, focusing on their everyday experiences, cultural knowledge, moral interpretations of human-environment relations, shared narratives, and their situated socio-economic realities. Understanding these perceptions requires recognising the complexity of separating climate from a wider bundle of socio-economic, political and cultural changes. While my initial research was specifically focused on climate change, from the beginning of my fieldwork, it became clear that the Chakma spoke about the changes more fluidly, without separating climate from other changes. What I encountered was not a discrete "climate story" but a set of overlapping narratives. They discussed experiences of environmental changes connecting them together with market dynamics, demographic shifts, livelihood changes, infrastructural shifts and cultural transformations. Rarely did they isolate climate change as a standalone concern. This reminded me of Crate & Nuttall (2009), who observed that climate change in indigenous narratives is often perceived as one of many intertwined forces, never in isolation.

In presenting perceptions, this chapter acknowledges the difficulty of truth claims in ethnographic representation. What my interlocutors shared about the past – abundant forests, richer harvests, regular and predictable rain, reliable seasons, etc. are not empirical reconstructions of historical fact but representations of the past as perceived in the present. Echoing Ricœur (2004), I am not making claims about the factual accuracy or truth value, rather, I am interested in how these narratives function as representations — as ways in which people make sense of their changing environment by drawing on both individual experiences and collective memory. As Crate and Nuttall (2009, p. 18) argue, social memory serves as a cultural resource that communities use to interpret environmental variability and change. Similarly, Roncoli et al. (2009, pp. 92–94), emphasise that life histories and cultural memory operate as an interpretive lens to understand how environmental transformations are narrated and understood by a particular community. For the Chakma, recollections of memories of the past as reliable seasonal patterns, abundant forests, and predictable rainfall are not mere nostalgia but frameworks as well as a reference point for making sense of present changes. They serve as tools for comparing experiences, explaining current vulnerabilities, and imagining future possibilities. I also draw from the theoretical framework of interpretive anthropology of Geertz (1973). As he advocated for a "thick Description" (Geertz, 1973) of culture - understanding not just what people do, but the meanings they assign to their actions. This aligns closely with my aim to capture

not only what the Chakma say about environmental change, but how they construct these narratives as part of their lived realities.

Throughout this journey, I was mindful of a critical methodological and ethical challenge inherent in studying indigenous perspectives on environmental change: the risk of romanticisation. Scholars such as Alpa Shah (2010), who worked with indigenous communities in Jharkhand, India, advised against portraying such communities either as pure custodians of nature or as victims trapped in ecological prisons. Such portrayals tend to oversimplify complex realities, neglecting the ways indigenous people actively engage with modernity, markets, and state policies. I have been mindful to avoid such portrayals. My aim is not to illustrate the Chakma as timeless custodians of ecological harmony but to present their voices with respect as they were shared with me.

At the same time, it is important to recognise that the community is not homogeneous in its experiences or perceptions. My interlocutors included *karbaris*, elderly women, men of varying professions, groups of young people, schoolteachers, housewives, traditional healer, shopkeeper women, women selling vegetables in local markets, fathers whose sons had migrated to towns and factories, farmers, local fertiliser dealers, women active in local administration, government service holders, health workers, and *tomtom* drivers who often shared the latest village news while waiting for passengers. Their perspectives varied along lines of gender, age, socio-economic position, and personal experience. Women, for example, who work as shopkeepers, vegetable sellers, seasonal labourers, and housewives, often described environmental changes in terms of food security and household economics. Elderly farmers often reflected on the shortening of jhum cycles and declining soil fertility, while younger individuals, spoke of opportunities beyond traditional farming. This internal diversity challenges any homogenised portrayal of the Chakma and underscores the necessity of paying attention to intersectional experiences. Also, this diversity enriches the analysis and underscores that there is no single “Chakma view” of climate change.

Finally, for clarity of analysis, this chapter focuses solely on perceptions, while recognising that in practice, perception, impact, and adaptation are interconnected. Community members do not neatly separate these categories in their daily lives. Yet, for the purpose of analytical representation, I present perception first, as understanding how people see their changing environment is foundational to any meaningful discussion of impact and adaptation strategies.

In this chapter, I organise their narratives into three analytical sections. First, I explore how the Chakma perceive environmental changes through a temporal lens, comparing the present with memories of the past - what they describe as a time of shwabhabik (normalcy). Second, I examine their moral and cosmological interpretations of change, where human actions and spiritual forces are seen as shaping environmental outcomes. Third, I discuss how they interpret environmental changes in connection with broader socio-economic transformations, including state interventions, market dynamics, and demographic shifts.

Remembering the Past, Sensing the Present – Perceiving Change through a Temporal Lens

The Chakma's perception of climate change is shaped by their comparison of past and present situations – a contrast between what elders call *aager din/ puraton din* (olden days) and *ekhonkar somoy/ bortoman obostha* (present situation) in relation to weather patterns, biodiversity, seasonal cycles, local landscape, forest health and resources. These were the markers by which they measured changes in their environment.

In my conversations with the community, one question consistently guided our discussions: "how have **weather patterns** changed since your childhood?" This inquiry, though simple, opened a window into the community's collective memory, allowing them to draw comparisons between the past and present that reveal insights into their perception of climate change. When I asked about the weather from 30 or 40 years ago, there was often a pause among my elder interlocutors. They often responded first with a prolonged "Ah…" accompanied by a distant look, as if they were sifting through layers of memories to retrieve images of a time long gone. In those brief silences, I sensed the weight of lived experience being retrieved and assembled into narrative form. These gestures of remembering were not incidental; they were as much a part of the telling as the words that followed.

One of the most persistent themes in conversations about the past weather patterns was the notion of *shwabhabik* — a local term meaning "normal" or "natural" in the sense of expected, familiar conditions. When asked about the past, especially during long conversations in courtyards shaded from the harsh midday sun, elderly men and women often described earlier years as more shwabhabik. In their recollections, the weather of their childhood was "normal." This normalcy, however, was not about exact rainfall data or temperature records but lived experience of balance and comfort. I remember my first detailed conversation with a Karbari in Rangapani Chara, in boiling

heat of an afternoon. I call him Golap Krishna Chakma, a man in his mid-sixties. I sat on a plastic chair at his courtyard. An elder, a retired jhum cultivator, slowly fanned himself with a handheld fan sitting on another chair. His gaze was fixed on the cloudless sky. Before responding to my question about how he perceived the weather changes over the years, he inhaled deeply from the *hookah* (a kind of smoking common in the CHTs and in rural areas) and let out a lingering "Oh…". "It was *shwabhabik* back then," he finally said. "Rains arrived on time. Looking at the sky and the shapes of the clouds, we could predict when the rains would come. We planted jhum as soon as the first rains softened the hills." As our conversation shifted to the present, a different picture emerged, and the narrative took on a different tone. The once "normal" weather patterns have given way to a reality marked by unpredictability and change. Rainfall has become more irregular and less reliable, with prolonged dry spells followed by sudden, heavy downpours. As Golap Krishna continued, "the rain does not come when it should, and when it does, it is either too much or too little." What happened in the middle of our conversation, was like a literary display of what he just said. In less than five minutes, the sky was covered with dark cloud, and it started raining heavily. Consequently, we had to move inside the house to continue the discussion. At that point, his brother, a father of two young sons — one of whom had migrated to work in a garment factory in Chittagong — gestured towards the dripping eaves of their tin-roofed house. "In the old days, rains like this came only in Boishakh," he said, referring to the Bengali calendar month associated with predictable monsoon rains. "Now they come whenever they please, or not at all" he added. His observation was not simply an expression of discontent; it was an assessment grounded in lived experience and shared community understanding. Aria Mia Chakma, a schoolteacher from Dighinala who currently lives in Khagrachhari town, also remembered how the monsoon rains were once more predictable. As he said, "during Boishakh, heavy rains would fall, lightning would strike the tall *sakko* (local tree name) trees. We never stood under those trees during storms because we feared the lightning. Now, the rains come less often and less predictably."

The normalcy of the weather pattern of earlier time was also defined by the regularity, duration and variation of seasons. The seasons were not just cyclical shift but crucial temporal markers that regulated agricultural practices and daily lives. During a group conversation in Middle Banchara Rasik Mohan Karbari Para, where several elders and younger farmers had gathered at a tea stall, the discussion naturally flowed towards recollections of seasonal rhythms. The *karbari*, accounted after passing the *hookah* to another farmer seated nearby "in our youth, the seasons were our calendar. There were six seasons (summer, monsoon, autumn, late autumn, winter & spring), each one returning with a rhythm." Now, another participant continued, "there are only two seasons – very

long summer with irregular and unpredictable rainfall, and a short winter. It feels like we do not know the pattern."

Throughout such conversations, many people spoke about the temperature as well. "It was not like this before," one older man told me, wiping sweat from his brow during an unusually hot September afternoon. "Now, the sun feels heavier. The heat stays longer, and the rain does not come when it used to." In a shaded corner of the Dighinala bazaar, where women sold seasonal greens and vegetables, I met a group of women, most of whom were market sellers and housewives. One of them explained, "when the wind blew from the east in planting season, we expected good rain. Now, the wind comes, but it brings no water." At first, I thought they were simply reminiscing how things used to be. But I heard similar phrases and examples in many other conversations too. Over time, I understood that these memories, for them, are not just reflections of past, but ways of interpreting present-day changes.

These narratives align with Utsler et al. (2014) who stressed the relational constructs of environmental interpretations that emerge through human interaction. Such accounts further align closely with Vedwan's (2006) research among the apple growers in northwest India, who similarly perceived climatic unpredictability through disruptions in expected seasonal signs rather than scientific metrics. Like Vedwan's (2006) interlocutors, the Chakma assess climate change not through abstract statistics but through the sensory realities of daily life: the timing of clouds, the scent of impending rain, the readiness of soil underfoot. These reflections are more than personal memories; they represent collective memory where environmental knowledge is maintained and passed on through shared conversations and communal storytelling (Crate & Nuttall, 2009; Roncoli et al., 2009; Ricœur, 2004). In these moments, community members were not simply recalling isolated events but were participating in a social process of remembering, validating, and negotiating understandings of seasonal change. What these moments indicate is that people are not simply describing what is happening now. They are connecting past and present experiences to make sense of today's climate change in a broader historical context.

The unpredictability of rainfall and seasonal shifts was not limited to older interlocutors. At a tea stall in Noapara, shaded by an old jackfruit tree, a young *tomtom* driver waiting for passengers remarked, "sometimes, the rain falls so heavily I must stop driving. Other days, the sun burns all day, and people do not come out unless it is extremely necessary." He further added, "before, we saw animals crossing the road. Now, there are only people and vehicles." Though younger, his accounts reflected a

community-wide awareness of changing climatic patterns. It also underscores that climate perceptions are not limited to farmers but are present in everyday thinking across the community. Such accounts illustrate the intergenerational sharing of memory about farming practices and environmental expectations. The elders' recollections implicitly shape youngers' understandings of what is meant by "normal" rainfall or soil condition, reinforcing Crate & Nuttall's (2009) observation that social memory operates across generations, informing both perception and practice.

In most of the conversations around change in weather patterns, people talked about the importance of reliable, predictable weather in the past – especially for jhum cultivation (swidden agriculture), which had long been their main way of living. It was directly connected to the land and predictability of the weather. Jhum cultivation, as they explained, required little more than the clearing of land, burning it to enrich the soil, and planting seeds. The hills were so fertile that no fertilizers, pesticides, or chemicals were needed. Simply planting was enough to yield abundant crops. "We did not know what fertilizers were" one elder told me with a hint of nostalgia. "Everything we needed; the land provided. We planted and it grew – paddy, vegetables, and fruits – all organic." The community was largely self-sufficient; except for a few items like salt and oil, all daily necessities were produced through jhum. Life was, in their words, "simple and easy." Their sense of self-sufficiency was tied to the reliability of the land's productivity as well as the stability of weather patterns. This relationship between the Chakma and their land reflected a situated understanding of local landscape. Today, however, the shifting climate has made this simplicity increasingly difficult to sustain. The once fertile soil now produces lower yields, leaving the community struggling to maintain their agricultural practices. As a fertilizer dealer who also plants fruit orchards and practices mixed cultivation on his lands, stated "the rain does not come on time; the soil is weaker; the forest is thinner. It is as if the land itself is tired."

However, they did not attribute such changes in soil quality and farming practices to weather conditions alone. Many also talked about the state forestry programs that promoted monoculture plantations – particularly *segun* (teak) – for commercial purposes. Such programs have reduced the availability of land for jhum. Market factors, such as the growing demand for timber and cash crops also contributed to the decline of traditional farming practices. Furthermore, they pointed to the availability of and increased use of pesticides and chemical fertilizers on the land that have reduced soil fertility.

Changes in the forest, biodiversity and local landscape also came up frequently in individual and group conversations, particularly during walks along the edges of cultivated fields and former forest areas. They often described changes in their surrounding forests and biodiversity through a mixture of recollection and present-day observation. For many, the forests of their childhood seemed fuller and more alive. “When I was a young boy, we saw deer, elephants, wild cats, wild chickens and many birds along the roads from Dighinala to Khagrachhari,” Aria Mia Chakma recalled. “Now, it is hard to find even a fox.” This observation was echoed by older people, who spoke of the forests not only as a source of livelihood but as part of daily life. An elderly man in Pukurghat recalled that, twenty to thirty years ago, hunting small animals and collecting forest fruits were regular activities. “There were plenty of birds and animals; we used to see turtles in the *charas*,” he said, referring to the forested hillsides and water bodies. “Now, they are rarely seen,” he added. Maya Chakma, a woman in her sixties, reflected on this during one of our extended conversations. We first met at her brother’s home, seated on a chair as she used a hand fan to keep cool in the burning mid-day heat. As we spoke, she invited me to her own home, a modest mud house with a tin roof, shaded by jackfruit and mango trees. “This was all forest” she remarked pointing to surrounding areas we were passing while walking to her house. She unfolded old photographs of her children, speaking softly of her daughter who had passed away young and her son who now lives in town. Looking down at a photograph in her hand, she said:

> *“When I was young, we used to wake up with the birds. The fields, the trees – they were all part of us. The hills surrounding our villages were abundant with wildlife like deer, tigers, elephants, and foxes roamed freely. Everything was shwabhabik. We could get everything from the forest – food, shelter, medicine. Whenever we visited the forest, we could return with nearly everything we needed. Now, we must buy many things from the market. The forest is still there but not like before.”*

Before I left, she opened her trunk and gifted me a handwoven scarf. With a smile that carried both warmth and melancholy, “take this. You remind me of my daughter.” Another elderly woman, Maya Chakma’s sister-in-law, gently fanned herself as we sat in her house. She offered us tea and fruits, and shared how, as a child, she used to accompany her family to collect firewood and wild fruits from the nearby forest. She stated, “we walked barefoot on the cool forest floor. There were so many trees. The forest covered the hills, and we could hear the sounds of birds all day.” These memories illustrate how their understanding and interpretation is rooted in lived, everyday experiences.

As conversations unfolded in different settings, it became increasingly clear that their memories of environmental stability are inseparable from their memories of local landscape. The notion of *shwabhabik* extended beyond weather patterns to encompass a broader sense of environmental familiarity. During a conversation in Middle Banchara, Arpi Chakma, a young woman working as a seasonal day labourer, invited me to join her for a walk. She wanted to show me the changes in her surroundings.

It was a bright but humid afternoon. As we walked along narrow mud paths bordered by green paddy fields, she pointed to a *chara* where she had once caught small fish as a child. “See this stream?” she said, stepping carefully over the slippery tree as we crossed it barefoot to go to the other side of the *chara*. “When I was a child, the water here was clear, full. We used to come after school to catch small fishes like *pudi, taki, chingri* (shrimp) and play in the water. Now, in the dry season, it is hardly flowing.” Her voice was neither sentimental nor dramatic; it carried a matter-of-fact tone, shaped by daily experience. As we continued, she pointed to the paddy fields, “the soil is not like before. Even when the rains come, the water does not stay as it used to. The ground dries too fast.” Her reflections mirror Roncoli et al.’s (2009) analysis of environmental knowledge and everyday life. In their research among the farmers in Burkina Faso, they found that ecological understanding emerges not through isolated climatic observation but through daily interactions with the land (Roncoli et al., 2009). For the Chakma, too, memory is not abstract but rooted in place-based, sensory experience of their surroundings. Additionally, such reflections highlight how environmental understandings are shaped through human interactions, interpretations, and traditional practices (Utsler et al., 2014).

During my conversation with a traditional healer woman in Rangapani Chara, who was tailoring a piece of cloth for herself as we spoke, talked about the unavailability of some medicinal plants. Sitting in her house, with medicinal herbs drying on a mat on the courtyard, she shared, “in the past, I could find what I needed in a short walk. Now, it takes hours, and I no longer see some plants.” An elderly man, who had invited me to his home after our initial meeting at a tea stall, later showed me the remains of what used to be a *chara* near his house. As we walked along the riverbank of the Maini River, he explained, “this river was once much wider and deeper. During my youth, boats carried people and goods. Now, in many places, there is hardly enough water to float anything.”

Such recollections were common during my fieldwork, especially among the elders, who often described the past as a time of environmental normalcy, or shwabhabik obostha. What unified these diverse voices was the reference point of shwabhabik - a state of expected environmental behaviour

against which changes were measured. In the words of Roncoli et al. (2009) and Ricœur (2004), shared understanding functions as an interpretive framework, helping communities to construct meaning around environmental changes. For the Chakma, memories of timely rains, predictable seasons, abundant forests, and fertile fields were not static or romanticised. Rather, they served as interpretive frameworks to make sense of the present environmental realities. These memories are social narratives that are carried and reshaped through intergenerational exchanges and lived experiences.

Remarkably, while many Chakma described the above changes in rainfall, temperature, soil fertility, livelihood practices, local landscape, and seasonal variation with concern, their narratives were not uniformly negative. Some younger farmers mentioned that the irregular rainfall patterns have led to experimentation with short-duration crops. “We try different varieties now,” a middle-aged farmer explained. “Earlier, we relied on certain paddy types, but now, we grow what fits the changing rains”, he added. Some also acknowledged practical benefits of new plantations. “The fruit orchards bring income,” the fertilizer dealer noted. “We grow guava, mango, orange — not just for our homes but to sell.” Such statements reveal a pragmatic framing of uncertainty and transformation. While there is clear nostalgia for the abundance of the past, there is also recognition of new opportunities. I observed similar perspectives among a group of younger men and women in a local market. They spoke about how the environment continues to change, but not all saw it as purely negative. “Yes, the old forests are thinner now,” admitted a young farmer, arranging his baskets of guavas and green chillies for sale. “But we have orchards, and we can sell fruits and make money.” A young woman vendor sitting beside him added, “we do not go to the forest much. We have other ways now.” Their opinions demonstrate how perceptions of environmental changes have changed over generations. The elder generation uses the past as a point of reference to comprehend what has changed or been lost. The younger generation, on the other hand, acknowledged these changes but also highlighted new opportunities. This difference is characterized by a peaceful coexistence of viewpoints that are influenced by individual life experiences and the practical realities of daily life.

These insights were further enhanced during my conversations with women. One woman selling vegetables in Dighinala Bazaar said, “we used to know when to plant by the signs in the sky.” She was sitting under bamboo shades to get out of the afternoon sun. We cannot rely on the sky anymore”, she added. Another woman who was also selling vegetables sitting nearby and was a bit older said, “we were fully dependent on nature for farming. When our guesses about how the weather would go wrong, our crops were affected. And, we had to starve.”

Alongside generational perspectives, such accounts highlight how the community actively interpret and engage with the environmental changes. Climate narratives are not just isolated weather events – they reflect deeper uncertainties about traditional practices, environmental signs, and broader socio-economic change. People do not separate weather from their daily lives; they understand seasonality, rainfall, and temperature change through personal experience and memory. Their interpretations vary along the line of age, gender, occupation and lived experience. Whether at a lively market stall or quite courtyard, these conversations reveal a complex, layered and socially situated understanding of a changing environment.

Climate Change as the Earth's Way of Reacting to Human Actions: Cosmology, Spirituality, and Indigenous Knowledge in Perception

As I worked in the field, it became clearer that many Chakma do not perceive climate and environmental changes as separate or purely physical events. Instead, they interpret changes in environment within broader relationship between human action and Earth's reaction – a subtle but powerful way of conceptualizing "cause and effect." As people talked about changes in the environment, they naturally started to think about their own deeds, morality, cultural knowledge, and spiritual matters.

Cosmology and Creation, Spirituality and Cultural Resources

Cosmological narratives play an important role in the Chakma's interpretation of environmental changes. I remember having a conversation in the Indigenous Communities' Cultural Centre in Khagrachhari town. That's where I met Aria Mia, a schoolteacher from Dighinala who had moved to the town. As we sat down in a corner of the center, the soft sound of guitar practice and dance warm-ups came from a room nearby, making a nice background for our talk. Reflecting on stories he had heard since childhood, Aria Mia recounted how the creation of the earth is understood among the Chakma. As he shared:

> *"In the beginning, there was water everywhere; slowly, the earth came up. Our ancestors believed that Gozeng Debota, the supreme deity, created the earth and life. Gozeng Debota created humans to fill the earth, but at night, spirits - known as bhutera would consume the humans created during the day. To protect humanity, Gozeng created the Black Dog. The Dog's barking scared away the spirits, allowing humans to survive and multiply. Gozeng Debota recognized that for humans to thrive, they needed*

food. However, Gozeng himself could not create food grains; it was Lakshmi Debi, the deity of crops and fertility, who possessed this power. Gozeng sent Kalaiya Debota to bring Lakshmi Debi from the celestial realm. But Kalaiya Debota got too caught up in the feasts of heaven - drinking, dancing, enjoying the fruits. He failed in his task. Eventually, Biyattara Debota, son of the river deity, took up the mission. He negotiated with Lakshmi Debi, promising that she, too, would be worshipped during river ceremonies. Satisfied, Lakshmi Debi agreed to descend to earth, travelling on a web spun by a spider, accompanied by a crab and a pig for assistance. She taught humans how to farm, how to grow rice and vegetables. Since then, our fields have been blessed.

Beyond its mythic symbolism, this story reflects a worldview where environmental well-being is linked to God's will and human conducts. It frames environmental abundance and scarcity within a moral economy, where people see their actions as connected to cosmic order.

Furthermore, this story supports Crate and Nuttall's (2009) claim that indigenous cosmologies view environmental changes as indicators of broken ties between humans, nature, and the spiritual world. They stressed that these stories give us moral frameworks that help us behave and take care of the world (Crate & Nuttal, 2009). Similarly, Geertz's (1973) interpretive framework reminds us that we must study people's symbolic meanings of their surroundings to understand a culture. Aria Mia's narrative is not just a story but an interpretive framework that is being used to understand contemporary environmental change. According to Karlsson's (2011) study with the indigenous Garo community in Northeast India, cosmological myths make environmental activities seem normal and acceptable. The Chakma's story of creation shows the importance of respecting nature. Actions such as cutting down trees, degrading soil, or neglecting tradition are understood not only as ecological destruction, but also as moral failing that causes chaos and imbalance. This way of interpretation aligns with Roncoli's analysis. They asserted that many communities conceive weather, climate, animals, mountains, and other landscape features as part of a "moral universe" that include both humans and nature (Roncoli et al., 2009, p. 97). Decline of such features, whether due to disrespectful use or climate change, is considered as a loss of meaning and cultural identity.

In the cultural centre's informal setting, Aria Mia's narrative bridged the mythic past with the changing realities of the present. "Now, we do not always honour these traditions. People are busy, they forget the old ways. Maybe that is why nature is not as generous as before" he reflected. This underscores the role of spiritual and cultural practices to restore the environment. Similar theme surfaced at a tea

stall near Banchara Murapara where a few farmers were taking a break from their work. An elderly man remarked that cutting down too many trees are like “hurting the earth itself.” He compared it to neglecting one’s own health – a metaphor that others nodded to. People sitting close agreed with him when he asked, “if we keep hurting the earth, how can we expect it to stay healthy?” These discussions demonstrate that the Chakma cosmology and spirituality are not abstract concepts. They are shared way of sensing and interpreting changes in their surroundings. Remarkably, these perspectives were not confined to the memories of past or narratives of decline. They reflected an ongoing framework through which people perceive their responsibilities towards the environment.

In the Chakma cosmology, the ground is a living entity capable of feeling and responding to human conducts. In this sense, environmental harm like cutting trees, loss of biodiversity, and overuse of natural resources, are believed to trigger a reaction from the Earth – a form of restoration, causing climatic changes. This spiritual way of understanding climate change aligns with Berkes’ (1999) findings. In his research among the Cree Indians in subarctic Canada, Berkes (1999) argued that indigenous cultures have traditional ecological knowledge (TEK). He noted that from the Cree’s perspective, nature is understood as an interconnected system, and humans are seen as a part of this system. Similarly, for the Chakma, climate change is not just about weather but a spiritual issue that impacts human-nature relations.

Moral Ecology and Changing Ritual Practices

The Chakma’s moral ecology - the ways they relate ritual observance, human behaviour, and environmental wellbeing also influences how they perceive environmental change. These interpretations are part of everyday life and are manifested in rituals. Though evolving in form and practice, rituals play a crucial role in the Chakma’s understanding of environmental changes. Such rituals include the Lakshmi Puja, Biju and Tammana Puja.

Lakshmi Puja honours Lakshmi Debi, the goddess of crops and prosperity. People believe that Lakshmi Puja makes the soil fertile and leads to abundant harvests. Lakshmi Debi holds significant position in community narratives, even though observances of the ritual is becoming less common. Aria Mia's narratives showed that Lakshmi Debi's arrival on earth was seen as the time when humans were blessed with food and farming knowledge. Her continued importance in the community's moral thinking reflects that environmental wellbeing is tied to respectful and responsible human conducts. During my walk with Arpi Chakma, I visited a small *ashram* (where local children receive religious

education) in Middle Banchara. At the ashram, we met a teacher, a young man in his thirties. He spoke about the role of rituals in maintaining ecological wellbeing. As he noted "in the past, we used to offer respects to the water bodies, the forests and the earth. These rituals were not only about belief but about reminding ourselves of our responsibilities. When we stated neglecting these, perhaps the earth began to stop giving too."

The same approach extended to the interpretation of Biju. With the intention of cleansing homes and natural spaces in preparation of the next crop cycle, Biju has historically been a time for ceremonial purification as well as social festivity. Interviews revealed how Biju includes prayers for enough agricultural output, offerings to water sources, and cleanup of village areas among other things. "Biju was like prayers, we asked for rains to come when needed, for the land to stay fertile," a Karbari stated. "Yes, we cleaned our homes, but we also cleaned the streams and pathways", he added.

Crucially, seniors were not the only ones who shared such narratives. Younger members, though less engaged in many rituals, shared compelling narratives. When I spoke with a group of young people, most of whom were in their mid-twenties, they talked about how their grandparents treated forests with respect as living things. "They believed that if you took too much, the forest might stop giving enough at some point," one of them said. He admitted, with a thoughtful pause, "maybe they were right. Now, we see fewer animals, fewer trees. The forest feels empty." Such reflections align with observations in other indigenous contexts. Karlsson (2011) noted that younger generations though more engaged with markets and modern livelihoods, still inherit ecological narratives from their elders.

However, many of the community members interpreted changes in ritual practices as a way of adapting to changing realities. For them, ritual practices have changed but not disappeared; their cultural values continue to persist. As a woman seller in a local market remarked, "we do not always have time for big ceremonies, but we still pray in our hearts for good harvests." Her comment highlights a perception of continuity through change – some ritual celebration may look different today, but they still guide how people understand environmental disruption as linked to human action. Such accounts also show the ongoing dialogue between the community's spiritual beliefs, ecological knowledge and evolving realities, all of which are integrated into their understanding of environmental changes (Utsler et al., 2014).

Local Knowledge and Climate Interpretation

Walking through the Chakma *paras*, I was often accompanied by farmers eager to show me the physical realities of their environment. These walks, typically along dusty paths surrounded by farmed lands and scattered orchards, provided insights beyond formal interviews. In the middle of a talk, farmers would stop to pick up a handful of soil and break it up in their hands to make their point. One farmer held up the soil to the light coming through the trees and said, "look at this. It used to feel softer. It is now hard and breaks in the sun." These gestures reflected a form of knowledge shaped not only by long-term experience but also by their everyday observation and interaction with their immediate environment. As we continued our walk, the same farmer pointed to an area where years of jhum cultivation had depleted the land. He waved his hoe across his shoulder and said, "once, this hillside gave good crops. Now, even if we plant, the yield is poor." His observation reflected his awareness of declining soil condition – a concern shared by many farmers I spoke with.

Climate change is interpreted by Chakma people based on visible, observable changes in their immediate environment. Their ecological knowledge shaped by lived experiences and oral histories, is close linked to how they observe water, soil, plants, and animals in daily life. During our conversation in Middle Banchara Satyajit Karbari Para, a farmer told me, "water in our *chara* (streams) is lower every year. The fishes are also gone. The plants we used to collect for medicine do not grow here anymore. The land is not the same." Also, they repeatedly mentioned about Maini River, remembering its clear water where they used to bathe.

Such insights show that the community's interpretations of their immediate environment are grounded in close observations and ecological knowledge rather than scientific data (Crate & Nuttall, 2009; Utsler et al., 2014). As Berkes (1999) argued traditional ecological knowledge is linked to specific places and shaped by its unique ecological features. From a dwelling perspective (an idea that humans do not just live in an environment, they live through it), this knowledge emerges through active and embodied enagement with local landscape (Ingold, 2000). As Ingold (2000) argued, people's perception of the environment is shaped by embodied engagement through skill, movement and sensory awareness (Ingold, 2000). In this sense, the Chakma's ecological knowledge develops through their continuous engagement with their local environment.

Disaster and Climate Interpretation:

Perceptions were also expanded around recollections of disasters such as seasonal flood, drought, landslides, hailstorm, etc. They often framed such disasters as part of an ongoing exchange between

human actions and ecological reactions. As I walked with a karbari and another elderly man through an area that once used to be forested, one of them pointed to the bare slopes and explained, “the roots used to hold the soil together. When the rains came, we did not fear them like we do now. Now the ground feels unstable, like it could slip away any time.” The Chakma perception that the forest “holds the soil” and its loss makes hills unstable - mirrors the Dayak understanding in Dove's (1993) study. The Dayak communities in Kalimantan, Indonesia, described forests not only as sources of livelihood but also as ecological stabilizers - protective barriers against landslides, erosion, and floods (Dove, 1993). During monsoon season in particular, Chakma families reported staying up through the night, anticipating heavy rains that might cause landslide. As I was talking to Mona Chakma, a farmer from Middle Banchara, he shared “we do not sleep deeply when the rains come. We listen for changes. We wait for the morning, hoping the ground does not move beneath us,” he continues. His mother added to the discussion, “I remember when a landslide took a part of our field—just a small area, and we could work around it. Now we lose large parts, and they cannot be recovered. My daughter’s crops were swept away last year. We wait for rain to water the land, and then it takes it away.” Many of the community member also talked about the increased frequency of floods in recent years. Often, they explained such experiences of natural disasters associating them with human responsibilities. As Mona Chakma stated, “it rains heavily cause the hills are bare now, the water comes down too fast and too strong.” He was referring to deforestation that had accompanied the spread of commercial plantations and logging activities. I observed similar way of interpreting human action in relation to environmental shifts among the younger members as well. During conversation with a youth-group at a local activity center, where they gathered in the afternoons, younger men spoke about landslides that had occurred in recent years. One young man recounted how, during a particularly heavy monsoon, a hillside near his para collapsed, burying parts of a farmed land. “The soil could not hold because too many trees had been cut,” he observed, as others around him nodded in agreement. Their remarks highlighted an awareness of the relationship between land management and disaster risk.

Remarkably, these narratives were not uniformly emotional in tone. Older individuals often spoke of loss, whereas younger people highlighted practical adaptation. Many people concluded with views on how the community had changed and could change. “We cannot stop the rains or the floods,” a young farmer said as we visited his fruit orchard, “but we can plant smarter, build better walls, and respect the land more.” His words emphasized proactive environmental risk management based on remembrance, observation, and community conversation.

Understanding climate change as the Earth's response to human actions aligns with eco-theological perspectives, such as those proposed by White (1967). He argued that the ecological issues fundamentally represent a crisis of values. White (1967) pointed out that the separation between people and the environment in Western thought contributes to ecological problems. He critiqued the anthropocentric viewpoint in Western thought that frames nature as subordinate to human control and suggested that such views contribute to ecological degradation. According to White (1967), cultural and religious frameworks through which people related to the environment shape their interpretations of environmental changes. Though there are differing perspectives, his framing of crisis as fundamentally ethical and value-based remains influential in eco-theological discourse. This emphasizes the need to rethink human-environment relationships in terms of mutual respect, responsibility and ethical reciprocity to address climate issues.

Perceiving Climate Change through Intersecting Drivers of Transformation

The Chakma people often talked about environmental changes in connection to socioeconomic changes alongside temporal, spiritual, and moral angles. They did not precisely separate other elements causing change from climate change. Interpretations of shifting rainfall patterns or declining soil fertility sometimes naturally flowed into subjects like market pressures, development initiatives, population growth, or the increasing use of pesticides and chemical fertilizers. This highlights the complexity of their experiences. Crate & Nuttall (2009) claimed that local experiences which are shaped by social, political, and economic factors have a direct relation to how communities perceive climate threats. Environmental change is seen by the Chakma as linked with a greater spectrum of challenges and possibilities.

Walking through the cultivated fields of Dighinala with local farmers really helped me grasp how livelihood practices have changed over time. Areas once used mainly for jhum cultivation are now split into commercial vegetable plots, teak plantations, and fruit orchards. "This used to be all jhum land," Mona Chakma explained while we were standing next to a row of young guava trees. What was striking in their narratives is that this shift was not attributed solely, to changes in climate. Instead, they linked the decline of jhum to a combination of state interventions, market pressures, and demographic growth. The same farmer continued, "before, we left the land to rest for years. Now, the land does not rest enough. But this is not only because of the weather. The government wants us to plant teak, fruit gardens and hybrid vegetables for markets. Jhum is difficult now - the soil is tired, and the production is not sufficient for our living." His comment illustrated a nuanced understanding of multi-causality. He did not view the declining soil fertility or shortened fallow periods simply because of

unreliable rainfall but acknowledged how population growth, state-led forestry initiatives and commercial incentives encouraged a departure from traditional practices.

One often heard topic of discussion was the development of segun (teak) gardens. Jyoti Chakma, a karbari from Noapara, pointed to rows of orderly grown segun trees and said, “segun trees rise high but leave the soil thirsty beneath. These trees extract so much water that nothing grows under segun trees.” However, “these trees are not for our homes. They are for business,” he added. His comment captured a shift in how the community perceives the purpose and ownership of forest resources. Where once the forest was viewed as a communal space, increasingly it is seen as part of commercial production systems, shaped by external policies and market demands. These experiences align with findings from other regions of South Asia, where state-led forestry and commercial plantations are changing subjective experiences and values around forests. Among the indigenous Garo community in Northeast India, for example, the decline of traditional forest management practices has been linked to reduced biodiversity and changing community-forest relationships (Karlsson, 2011).

Population pressures were also mentioned often as a reason for the changes. They believe that the growing population is severely stressing their environment and livelihood methods. They expressed concerns about the growing competition for land and water supplies. Jyoti Chakma said, “there are more people now than there was years ago. Where one family farmed in the past, now three families share the same lands.” Population increase is seen by them not just as statistics but as a real, daily experience that reduces possibilities for livelihoods and accelerates environmental pressures. The link between demographic transition and environmental stress resonates with Roncoli et al.’s (2009), work in Burkina Faso. They showed that in Burkina Faso, farmers connected declining soil quality and water shortage to both climate variability and population pressures (Roncoli et al., 2009). Similarly, in Dighinala, peoples’ accounts show that they understand environmental change through an articulation of both natural components and manmade changes.

However, the society did not simply see these developments negatively. Many believed that market integration had made things better and has provided with opportunities for income and access to fresh goods and services. “We can send our kids to school with the money we get from selling fruits,” one father said proudly. We were talking at his courtyard while he was waiting for his daughter to get dressed for school. “Education is important, and now we can afford it” he added before leaving for his daughter’s school. Similarly, younger community members, particularly those engaged in wage labour or small trading activities, often view market expansion as a way towards economic advancement.

During a conversation at a roadside shop where young men gathered in the afternoon, one youth expressed this optimism, “working in the fields is hard, and the returns are low. If we can grow crops for the market or find work in town, our lives can improve.”

The above findings present the Chakma’s layered and situated understandings of change. Instead of separating, they perceive climatic transformations as part of broader transformations where climate issues, state influence, market penetration, and demographic expansion, intersect. They believe that these factors together are reshaping their lives and the world around them. Such approaches contrast narrow framing of indigenous vulnerability and emphasize the importance of analyzing environmental perceptions within broader socio-economic, political, and historical context.

Conclusion

This chapter looked at how the Chakma community understands climate and environmental change in their everyday lives — through memories, beliefs, and social and economic experiences. What became clear is that they do not talk about climate change as something separate. Instead, their narratives reflected what Roncoli et al. (2009) described as a “multi-layered” understanding, where temporal and sensory observations, social exchanges, institutional influences, and cosmological meanings all interact.

The elders’ recollections of regular seasonal cycles, predictable rain, or ample forest resources are crucial frames of reference. These are not mere nostalgic remembrances but function as collective memory (Crate & Nuttall, 2009; Roncoli et al., 2009; Ricœur, 2004) to understand and assess current uncertainty. Collective memories are also fluid and play role in shaping varied perceptions. As seen in the generational conversations, younger members engage differently with these narratives, often focusing on immediate risks and future aspirations rather than past comparisons.

Importantly, the spiritual and cosmological interpretations of environmental change emerged as powerful frameworks. The belief that the earth responds to human actions reflects a moral and ecological understanding, where environmental disturbances are seen as interconnected with human behaviour. Moreover, perceptions are interconnected with other socio-economic and political dynamics.

These insights show that Indigenous perspectives, like those of the Chakma, are not fixed or monolithic. Rather, they change over time and are context-dependent. The community actively

engages with their environment. They use their cultural knowledge and past experiences to make sense of changes, while also adjusting to new situations and shifts happening around them.

This chapter contributes to anthropological and interdisciplinary discussions on climate perception by showing that local understandings are connected to context, experiences and different layers of meaning. It mirrors Crate and Nuttall's (2009) call for place-based knowledge systems and Shah's (2010) warning against labelling indigenous people as ecological hostages or beyond modernity. This chapter reveals that the Chakma are neither inactive nor isolated from change. They make sense of their surroundings through memory, observation, spiritual interpretation, and sociopolitical involvement.

Simultaneously, it is essential to emphasize that community narratives about the past do not serve as claims of historical truth but instead represent the ways individuals perceive the present. These representations are meaningful not because they offer objective historical accounts but because they provide frameworks for understanding and navigating present uncertainties.

Most importantly, these interpretations are not only about loss. There is no doubt that the environment is getting worse and people are experiencing challenges. However, people in the community also acknowledged positive changes, like easier access to markets, improvements in education, and improvements of infrastructure. Emphasizing the complex, ambivalent experiences of environmental and socio-economic changes, such acknowledgements resist any simplistic narrative of decline.

Finally, this chapter shows that to really understand these subtle perceptions, we need to take an ethnographic approach that pays close attention to the spaces, practices, and stories of daily life. This underscores the significance of acknowledging the diverse perspectives within the community, considering various generational, gender, and socio-economic factors at play. This further emphasizes the necessity of understanding climate perception in relation to wider social, political, and cultural frameworks.

Chapter 4: Impact of Climate Change and Vulnerabilities of the Chakma Community

In this chapter, I focus on the impacts of climate change and related transformations as experienced and articulated by the Chakma community in Dighinala. While the previous chapter addressed how people perceive and interpret environmental changes, and the next chapter will illustrate how they navigate them through various forms of adaptation, this chapter turns towards the consequences of those changes. It explores the observable effects on everyday lives particularly in relation to work, land, livelihoods, health, rituals, and communal relationships. The analysis is about: what types of vulnerabilities have emerged or intensified; and who is impacted and how?

During my fieldwork, I was constantly aware that the experiences shared with me did not follow neatly defined categories of cause and effect. When the community spoke, they did not separate climate change as a distinct or singular cause. Thus, similar to my previous chapter, this chapter is also grounded in the understanding that climate change (such as unpredictable rainfall, hotter dry seasons, and longer monsoons) does not function in isolation, it is one of the many interlinked drivers of change (including population growth, dwindling access to arable land, market expansion, state forestry programs, the spread of modern technologies, and evolving infrastructure, education, and communication systems). These forces interact with each other, sometimes intensifying and sometimes mitigating the effects each might produce independently.

In daily life, perception, impact, and adaptation are all closely connected and are often experienced simultaneously. However, this chapter analyses impact separately to focus on concrete effects that climate change and other social and economic factors have had on the the Chakma. These effects are formed not only by changes in the environment, but also by how people have perceived and valued past practices, as well as by the results of their own efforts to adapt, which have created new forms of vulnerabilities in many cases. Positioning this chapter subsequent to perception and prior to adaptation facilitates a layered understanding of how experiences of change unfold materially, socially, and physiologically, before delving into the strategies used by the community to navigate them.

Framing climate change as a “threat multiplier” (Crate & Nuttall, 2009) elucidates how environmental changes can intensify preexisting vulnerabilities and intersects with other socio-economic transformation. However, it is important to acknowledge that these vulnerabilities are themselves

historically constructed. Structural inequalities, stemming from land tenure systems, gender roles, spatial marginalization, and unequal access to institutions, influence the distribution and experience of impacts. Furthermore, they unfold unevenly, often influenced by generational and intersectional dynamics.

The subsequent sections analyze the impacts of environmental and socio-economic changes across various domains: agriculture, economy, social relations, cultural rituals, and health. The analysis offered here does not seek to provide a definitive account but rather presents contextual narratives that illustrate the multiplicity and complexity of lived experiences.

Ecologies of Dependency and Knowledge Erosion: Agriculture, Livelihood, Land, Market and Plantation Economies

Agriculture in Dighinala is not simply a livelihood activity; it is also a site of knowledge, memory, ritual, and change. Among the Chakma, jhum cultivation had long stood as a familiar practice. But in paras like Middle Banchara, Right Banchara, and Noapara, its practicality has increasingly come into question. Community members cited a combination of climate variability, particularly unpredictable rainfall and shortened monsoons along with population growth, land fragmentation, and expanding market pressures, as the primary reasons for the decline. This is consistent with findings of Nath et al. (2005) who studied sustainability of jhum cultivation in CHTs and found that the practice was increasingly becoming untenable. They noted that jhum is becoming unsustainable not solely due to environmental factors such as soil degradation but also due to socio-economic and political issues including “rapid rise in population, construction of development infrastructure and government policies on expansion of reserved and protected forests” (Nath et al., 2005, p. 137). In jhum fields, the community produced varieties of rice (jummo dhan, binnya dhan, chikon dhan, ranga dhan, and lakhi peri bini), millet, and maize. Alongside these staples, jhum fields yielded a range of crops like pumpkin, sesame, local lentil, spiny gourd, long beans, bottle gourd, sweet potato, wild taro, leafy greens, turmeric, chili, etc. These diverse farming supported both nutritional and medicinal needs. Now, such diversity is increasingly replaced by more uniform, market-oriented cropping. This shift has not only affected produces but also threatened food security and their ability to maintain agricultural continuity as many of these traditional crops are naturally adapted to the region’s original climate. It has further affected the passing down of agricultural knowledge, as younger generations find traditional methods less feasible and either move away from farming or turn to more predictable, yet costly, alternatives.

Decline in jhum has further resulted in the loss of traditional seed management knowledge. During different conversations, farmers shared that they carefully selected the healthiest seeds from each harvest, sun-drying and storing them in cool, dry airtight containers made of bamboo or clay, preserving them for future planting. As Maya Chakma shared "when the crops ripened, we selected and dried the seeds for storage. To ensure their quality, we tested the seeds by soaking them in water; if they floated, they were not mature enough." With the changed weather and availability of high-yielding hybrid seeds from commercial suppliers, maintaining traditional seeds management practices have become harder for the community. This reflects the decline in such knowledge system now. Remarkably again, it is not only changed weather patterns, season or soil quality, the availability of hybrid seeds in the market played a crucial role.

At the same time, settled farming and commercial fruit cultivation have expanded across the region. Pineapple, banana, papaya, lemon, orange and cucumber are now common crops. On an early morning walk through the fields near Banchara Murapara, Mona Chakma showed me the plots he had planted with papaya, guava, orange and lemon after leaving jhum. "It gives us quicker returns" he said. "And we do not have to depend on the rain the same way. Rather, these products sell better in town." His reasoning underscored the economic logic that now governs many agricultural decisions. Commercial orchards promise more consistent income streams compared to the long, uncertain cycles of jhum. The Chakma farmers' shift from jhum cultivation exemplifies this dynamic. It is neither a straightforward response to environmental change nor a simple narrative of cultural loss. Instead, it reflects calculated response to an evolving economic and lived landscape (what I have discussed in detail in the next chapter). In Dighinala, the desire for financial flexibility and the need to cover school fees, healthcare costs, or debts make commercial crops appealing.

This transition, however, is not without costs. It has resulted in increased dependency on market seeds and less crop variety. These hybrid crops, while productive, also come with heavy demands. They are more susceptible to pests and diseases; and require regular applications of fertilizers and pesticides, and intensive irrigation system, a sharp contrast to the naturally resilient native varieties. During my conversation with a young farmer in Dighinala bazaar, holding up a bag of hybrid seed, he explained "the company seeds yield faster in high amount; but comes with high costs, crops do not grow without fertilizers, pesticides, and continuous irrigation." Another farmer explained, "we buy fertilizer and medicine [pesticides], but if the crop fails or prices fall, we are stuck. Sometimes we sell through middlemen, and they give low rates. We have no cold storage or bargaining power." Their words

reflect the economic strain these seeds impose, as well as a growing dependency on market inputs, intermediaries and market access. In his analysis of political ecology, Robbins (2012) argued that such dynamics are not accidental; broader power structure influence them, making local communities dependent on external sources for knowledge, money, and technology. This dependency reshapes local ecologies, turning them into managed resources rather than lived landscapes (Robbins, 2012). This is evident in the Chakma farmers' accounts. Their land is no longer managed only by tradition or local knowledge, but increasingly shaped by companies and market demands.

Furthermore, the reliance on these high-maintenance crops raises the cost of farming and introduces new form of vulnerability. It traps farmers into a cycle of dependency on market-supplied agricultural products. Many Chakma families find it difficult to sustain themselves solely through agriculture due to the rising farming costs.

The transition to modern irrigation technologies, such as electric pumps, has increased agricultural outputs. However, it also comes with hidden costs. "Now we use pump machines for cultivation. We can grow more with the pumps" said Mona Chakma who has cultivated several large plots of fruit gardens. "But we rely on machines and resources we cannot always afford or maintain" he added. This shift to new technology presents a paradox: while productivity improves, it creates new dependencies on technology that require continuous maintenance, investment, and external knowledge. For the Chakma farmers, this transition reduces their control over natural resources turning them from resource users and managers to consumers within a regulated water economy. Their experience illustrates broader vulnerability as the state and market forces commodify water through irrigation schemes and draw communities into externally driven systems.

Fishing – another core aspect of Chakma subsistence has also been impacted by the changed weather patterns, particularly by the depletion of water sources and fading biodiversity. As Aria Mia explained, "we used to catch fish, snails and crabs in the streams. Now, the rivers and streams are almost dead; fishes are hard to find." This depletion underscores the broader transformation in subsistence practices and local knowledge. It also imposes a dual burden on the community: ecological degradation and economic marginalization.

Rituals in Transition: Impact on Cultural Continuity and Collective Identity

Among the Chakma, rituals such as *Noa Bhaat, Alpaloni, Tammana Puja*, were embedded in the agricultural cycle. They marked seasonal cycles, cultural continuity and collective identity to their

surroundings and each other. Yet, these ceremonies are increasingly under strain not only from changing belief systems but also from the material pressures of climate variability, land scarcity, labour fragmentation, and shifting household structures. As Aria Mia shared, “every year after the harvest in late autumn, we used to hold the *Noa Bhaat* ceremony (a celebration of new rice, described in chapter 2). Everyone would bring something, and we would eat together. Now, some do not even wait, they sell the rice early or skip the ritual.” For them, this celebration – attended by entire families and villagers – symbolized abundance and renewal. However, with the declining agricultural yields, shortened crop cycles, and a growing shift toward market-oriented farming, this moment of gratitude to land has lost some of its ritual timing and collective initiatives. Younger Chakma increasingly participate in the *Noa Bhaat* ceremony out of respect for tradition, rather than as an expression of personal connection or belief. As Aria Mia noted, “many younger people are busy in town or do not feel the connection anymore.” Many families, especially those engaged in fruit gardening or wage labour, no longer follow traditional agricultural calendar for ritual celebration. Similarly, the celebration of *Alpaloni* festival, (a day of rest and thanksgiving, described in chapter 2), has also been affected. As Maya Chakma explained during our conversation about rituals, “it was a break. We stopped all work, cooked food, made *kanji*, sang songs. Now we do not even have time.” The expansion of plantation farming, year-round cultivation and urban migration has eroded the temporal space for rest-based rituals.

This reflects a reality where rituals begin to lose relevance when they become detached from the community’s livelihood practices. What was once communal and seasonal has become fragmented and optional – still practiced in some households but increasingly disconnected from shared agricultural calendar. In Dighinala, rituals have not vanished; they have been repositioned, reshaped by both environmental changes and socio-economic transformation. Though the continuity of ritual celebrations in changed forms reflect adaptability and agency, it also reveals a kind of cultural vulnerability, as younger generations inherit not a stable cultural continuity, but a set of practices in flux, reshaped by forces beyond their control.

Climate change, in this context, interacts with socio-economic conditions and demographic changes and intensifies existing vulnerabilities as threat multipliers. It is not directly causing a decline in rituals but making the participation harder for many in the community due to growing logistical challenges. When the rain is delayed or unpredictable, it affects planting schedules. Consequently, the ritual timing of Noa Bhaat and Alpaloni is disrupted. Market integration also demands continuous labour and management for fruit and vegetable gardens, reducing people’s availability for ritual gatherings.

Migration further complicates this; young people are often away from the village during important ceremonial periods, making it challenging to organize the labour and materials required for more elaborated observances. Moreover, the decisions about whether to hold a puja, how to perform it, and who can afford to contribute are influenced by household resources, gender roles, generational positions, and access to agricultural land. At the same time, the inequality in ritual participation is widening within the community. Families with salaried jobs or multiple earning members can afford animal sacrifices or hold larger feasts. Others borrow, delay, or withdraw entirely. In this way, rituals – once community-wide and cooperative – are becoming more individualized and unevenly practiced.

What emerges from the above is not a static account of cultural decline, but an ongoing negotiation within a changing world. The Chakma continues to perform, adapt, or reconfigure ritual life—not in fixed forms, but in relation to changing demands of climate, land, labour, and belief. Rituals like Alpaloni and Noa Bhaat have not disappeared; they evolve – sometimes shrinking, sometimes relocating, sometimes quietly persisting in corners of courtyards or whispered prayers. The impacts are visible not only in what is no longer practiced, but in how rituals are practiced differently and by whom, where, and with what means.

Social Consequences of Climate Change

"There was a time when even the poorest did not worry during harvest. We all helped each other," shared an older man as I joined a conversation with two older men seated on a bamboo bench at a tea stall in Middle Banchara Murapara. In the Chakma community, people have long relied on one another through everyday acts of support. They help with work, care for those in need, and share responsibilities to sustain their livelihoods and social life. But these customs are now changing. Climate change, alongside pressures from modernization, market expansion, economic challenges, growing individualism, and new alternatives, is contributing to a reshaping of communal relations and social structures. These changes are adding new layers of vulnerabilities in the community.

As our conversation continued, the one of them mentioned *Malaye* – a traditional system of communal labour. Recalling how it worked, he explained:

> *"In the past, there was a culture in our society called Malaye. Arrangements were made to help the poor farmers by planting paddy and harvesting the crops at their homes. Community members would gather to help the poor farmers; and in return, we would share food and celebrate together. No wages were expected or paid for this work."*

Such an act of mutual aid and collective labour was more than just agricultural assistance; it was a demonstration of social solidarity and collective agency within the community. In exchange for this unpaid labour, the host family would provide a meal to the participating workers, reinforcing bonds of reciprocity and mutual care.

However, the community members acknowledged that *Malaye* is rapidly disappearing. The impacts of climate change and rise of commercial farming have made it increasingly difficult for farmers to sustain this tradition. Poorer families, already struggling meet their own needs, often cannot afford to host such gatherings, while others prioritize paid labour over communal work. I remember how Jyoti Chakma put it, “now, everyone counts their own time and work. Labour is not offered free as such. Even for one day's help, you have to promise something in return.” His words reflect a shift from community-based cooperation towards the monetization of labour. Participation in communal labour is now increasingly negotiated through market principles, widening social divide between households with differing resources. Commercial fruit gardens, shortened jhum cycles, and unpredictable rainfall have made agricultural schedules more rigid, pushing many to seek cash income and leaving less time for unpaid reciprocal labour. The cooperative social structure is further weakened by the fact that the younger Chakma often travel for temporary jobs or engage in wage labour. This shift reflects broader transformations in social relations under modern agricultural pressures. Financial precarity, the necessity to act quickly before irregular rain, and the paras' thinning labour force have all contributed to the fragmentation of mutual support systems. Thus, agriculture has become increasingly commercialized and individualized placing pressure on traditional forms of cooperation and reciprocity, which are now often negotiated through market-based relationships. In his analysis of climate-induced displacement, Oliver-Smith (2009) argued that environmental disruptions not only displace people physically but also exacerbate social fragmentation by upsetting the traditional support systems. Such fragmentation increase vulnerability and threatens long-standing networks of mutual aid and shared identity (Oliver-Smith, 2009).

Crucially, not everyone experiences these changes in the same way. Families that own more land and have fruit or vegetable orchards or irrigation systems, can hire workers or use contemporary farming technologies. Smaller households are more susceptible to losing unpaid support, particularly those headed by women or older members. This disparity illustrates the political ecology of vulnerability - the way structural inequality affects how risk and support are shared. This also aligns with broader anthropological discussions about how climate change disproportionately affects marginalized and

indigenous communities, who often rely on communal systems of reciprocity and shared labour (Crate & Nuttall, 2009; Mamtaz et al., 2018; Mustajib, 2020).

However, it is not that all cooperation has disappeared; some people are still working together. I met women in Dighinala bazaar who share the transportation costs to get their produces to the bazaar. In Banchara Murapara, two neighbouring households consistently took turns caring for each other's gardens on alternating days. Arpi Chakma also shared that her family and her neighbours' family share labour in their fields during the planting and harvesting times. In case of severe hardship, the *karbaris* also facilitate support from the community for the poorer families. These forms of collaboration, even though often smaller, more private and less formal, persist. Although less visible, such small cooperative actions signify modification of solidarity to constraints.

Nonetheless, there is a transition from ritualized, community labour toward fragmented and transactional assistance. This shift transcends mere modernization or personal choice. It is the outcome of demographic changes, economic restructuring, and climate-induced pressures. The community is not rejecting solidarity; rather struggling to maintain it. When analyzed through the "threat multiplier" (Crate & Nuttal, 2009) framework, climate change does not independently undermine social cooperation. Instead, it exacerbates pre-existing vulnerabilities, rendering previously viable systems untenable.

Ultimately, the decline of communal labour and mutual aid indicates more than a mere economic adjustment. It indicates a transformation in Chakma social life, wherein cooperation is not collective by default but contingent and conditional. The principles of solidarity persist; however, their implementation is influenced by scarcity, necessity, and uneven access. This subtle reconfiguration is not always mourned, yet it is broadly acknowledged.

Health Implications

In the Chakma society, formal care has never been the only aspect of health. Rather, health is regarded as a relational experience impacted by food systems, dietary habits, health-related ritual practices, environment, and collective care. However, this relational system is currently being disrupted in various ways. The changes in agriculture, labour, and environmental conditions are not solely economic and structural; they are also experienced through the body and emotions. The effects are evident in persistent fatigue, stress, health issues, and changes in caregiving practices, along with the interruption of routines that previously facilitated rest, social interaction, and communal well-being.

The Chakma now find themselves increasingly dependent on market-based food sources as the forest gets smaller and biodiversity declines. Market access brings more challenges, even though it helps with the issues of reduced forest resources. They see market foods as not as good in quality and nutrition compared to food ingredients sourced from the forests and jhum field. According to them, market-based food is “harmful” because of the chemical contamination from the excessive use of chemical fertilizers, insecticides, and artificial preservatives. The shift away from traditional ingredients indicates broader implications for community health and dietary practices. They now have a greater reliance on market products, which has led to a noticeable rise in chronic diseases including diabetes, high blood pressure, kidney problems, strokes, and even cancer. Besides market foods, they attribute the increase in chronic disease to dietary changes, environmental degradation, decreased physical activity, and the costly modern healthcare system.

The Chakma community's vulnerability to diseases can be analyzed using Holmes’ (2013) structural vulnerability Framework. This framework stresses how social, economic, and political conditions shape health outcomes. Holmes' (2013) ethnographic study of Triqui migrant farmworkers in the United States identifies inadequate healthcare access, economic marginalization, and systemic neglect as primary contributors to health disparities, rather than solely individual issues. Similarly, in the Chakma context, impacts of climate change and market dependency on health are intensified by their geographic isolation, economic instability, and limited access to healthcare resources. Vulnerabilities for the Chakma further arise from the altered physical routines and dietary patterns. The reduced reliance on forest labour, for example, has contributed to a more sedentary lifestyle. Activities like hunting and foraging once supported physical wellbeing. With motorized transports now widely accessible, mobility has increased but daily physical activity has decreased. Importantly, while modern farming can be physically demanding in specific ways, the decline in forest-based activities have reduced more diverse forms of daily movement. This shift reflects a transformation in the labour nature and its embodied impacts. The Chakma context, thus, complicates the assumption that modern amenities inherently mean improved well-being, showing that adaptation to climate-induced changes may have unintended health consequences. This highlights the needs to re-evaluate structural vulnerabilities when designing adaptation strategies.

Traditional Chakma healing practices and medicines relied on the forest plants and the knowledge of community healers. These methods are based on a knowledge system that has been passed down for generations. During my conversation with a local healer in Rangapani Chara, she shared that

previously, community healers known as kabiraj (herbalists) and ojha (healers) used medicinal plants from the forest to treat a range of illnesses, from broken bones to skin infections. Now, many of these plants are hard to find. Her reflection exposed a scarcity that not only impacts her work but the entire community's health. With such shift in the availability of medicinal resources, the community increasingly turns to pharmaceuticals in local markets or health facilities in urban areas that are far from most of the paras. Though the recent infrastructural development like pitched road and motorized vehicles has improved access to urban healthcare, they repeatedly described these modern medicine and treatments as "expensive" highlighting the financial challenges in accessing them by all. Their shift towards allopathic medicine is partly influenced by the depletion of natural resources essential for their traditional healing practices. At the same time, the global health discourses that prioritize biomedical approaches have contributed to the marginalization of the community's indigenous knowledge systems. As the healer reflected "my children do not know the plants the way I do. They do not know which plant does what." This observation reflects how the intergenerational flow of knowledge is being impacted. These changes question the assumption that formal healthcare solutions inherently represent progress for indigenous communities, as these services might not align with cultural values or be evenly accessible. This context further underscores the needs of understanding complex interactions between ecological change and socio-economic challenges in producing new forms of vulnerabilities.

Another important issue emerged during my conversations with the community people regarding the health implications of climatic and other transformation – decline in communal caregiving behaviour for the sick. In the community, it was a usual practice for neighbours to alternate in providing care for those who were ill for prolong periods. As Maya Chakma shared, "earlier, when someone was sick for a long time, the whole para would take responsibility to helping them." Villagers would alternate caring for the sick, particularly at night, allowing the patient's family to rest a bit. This form of caregiving was served as an expression of solidarity and communal identity. "Now, who will come? Everyone is busy and exhausted. It is the patient's own family members who are responsible for care" she added. Her accounts demonstrate how families are becoming more and more isolated in their caring responsibilities. The fading of this communal caregiving practice reflects both social fragmentation and rising economic strain. As crop yields reduce due to changed weather patterns, and livelihoods become more difficult, families face growing economic uncertainty. Consequently, they are less able to contribute time and resources to communal activities. Instead of offering support to neighbours, families are in need to prioritize their own survival.

Another example of the fading communal care is *Bhaat Moja.* It is a post-partum meal sharing custom that involved providing a new mother with nutritious meals from different households. This ritual was not only an expression of care towards ensuring physical recovery of the mother but also a reflection of the collective responsibility the community felt to its members. Over time, however, this custom has faded. The community members shared that this practice is rarely seen nowadays. The decline of this practice is indicative of a broader trend where climate-induced food insecurity has made such traditions difficult to sustain. As rice and other staple crops become more difficult to grow, families are less able to save extra food for communal sharing. Many families, consequently, are no longer able to provide foods for others. This shift may be linked to other factors including increasing individualization of family life.

The deterioration of informal care structures underscores the intersection of climate change and gendered vulnerabilities. The decrease in *bhaat moja* signifies not only a nutritional gap but also a weakening sense of collective responsibility for maternal health. This demonstrates how material scarcity contributes to increased health risks for women in the postpartum period, intensifying their isolation during a time of physical and emotional need.

Beyond illness and postpartum recovery, the physical toll of changing labour patterns was widely acknowledged in the community. Elders described more frequent cases of fever, headaches, digestive issues, and joint pain – often linking to shifting workloads and the body's reduced capacity to cope, particularly in extreme heat. The community is further impacted by changing labour patterns. Today, many individuals work long hours in commercial gardens or as hired workers, often under intense sun and unpredictable weather conditions. Describing how she works in others' orchards, cut soils and manages all domestic chores, Arpi said “my body feels tired all the time.” Likewise, a young man who works in commercial fruit orchards shared how the rising temperatures has made daytime work difficult for people like him. However, due to high cost and limited availability of formal healthcare, particularly in remote *paras*, most individuals treat their symptoms at home; either through traditional herbal medicines or resting in silence.

The emotional impact is also substantial. Some interlocutors especially women and elderly individuals, reported experiencing worry, isolation, and emotional fatigue. A widow in Rangapani Chara, residing with her daughter and grandchildren shared that previously they used to gather with others in the evening to enjoy the free time or rest together. Now, people are busier. Her experience indicates a sense of loneliness and the decline of communal pauses that previously characterized daily life.

These physical and psychological strains have been exacerbated by the increasing unpredictability of small-scale but frequent disasters in recent years. People expressed concerns about living with ongoing uncertainty – particularly during monsoon season – marked by a persistent fear that something might happen. A *tomtom* driver once shared that he could not work for three days amid last year's heavy rain. As he said, "there were no road, no passengers, no income." Though temporary, such disruptions had cascading effects – causing people to miss payments, skip meals, or postpone hospital visits. Disaster such as landslides also affect people's 'sense of home and place' (Crate & Nuttall, 2009; Oliver-Smith, 2009) and exacerbate psychological pressures. Importantly, health is also spiritual. Several interlocutors spoke of how rituals once served to protect them. Ceremonies like *Tammana Puja* were performed during environmental distress. The absence of these symbolic practices not only reflects shifting beliefs but also removes collective emotional responses to crisis. Without shared rituals, coping becomes more individual.

In the above elaboration, it is evident that the impacts of climate variability and agricultural changes are not limited to material systems of production. They are layered and embodied. They are experienced through the body, through labour-induced fatigue, through mental worry, and through changing care relations. These layered impacts reflect how climate change creates and multiplies existing vulnerabilities. In contexts like the CHTs, where communities face long-standing marginalization in healthcare provision, climate-induced stresses intensify existing vulnerabilities, turning manageable conditions into persistent crises for those with fewer resources and limited institutional support.

Gendered and Intersectional Vulnerability

The impacts of climate variability, environmental transformation, cultural and socio-economic change are not experienced uniformly across Dighinala. Their experience of impacts varies according to gender, age, income, family structure, spatial location, and access to resources. These factors influence the distribution of burdens, the availability of options, and the levels of exposure to physical, emotional, and financial stress.

In the domain of agriculture, the transition from jhum to cash crops and fruit orchards has led to gendered shifts in labour and decision-making. Women who now harvest plots or sell produce in local market described gaining some autonomy; however, this autonomy comes with more workload. Going back to Apri Chakma's daily routine: cutting soil, cleaning gardens, doing household chore, taking care

of her parents and grandmother and the list continues. She gets almost no time to rest. This is not unique to Arpi, women across different paras bear such responsibilities. With men increasingly engaging in seasonal migration or wage labour, women are often left to manage farms, households, and care responsibilities.

The intersection of gender and age is also evident. Elderly and widow women reported difficulty accessing irrigation facilities during dry months. In contrast, adolescent girls and younger women spoke about their growing involvement in market work and wage labour, roles previously dominated by men. These shifts are not merely about empowerment; they are often responses to economic necessity. One young woman in Right Banchara once told me, "I go to the *haat* (local market) to sell fruits. My brothers are away. Someone has to do it." In the community, a young, landless, female-headed household faces different risks than a male-headed household with salaried income or remittance support. Likewise, men are also impacted by the shifting burdens. People who worked during the day in intense sun or heavy rain reported their physical exhaustion. If they decide to take a break, their families will have hard time. The gendered experiences illustrate a diverse range of embodied vulnerabilities shaped by climate pressures and socio-economic status.

Climate-induced health vulnerabilities also show intersectional impacts. The decline of caregiving networks and *bhaat moja* disproportionately affects women, particularly postpartum mothers. Absence of these practices put additional pressure on individual families, especially those without extended relatives nearby. In Noapara, a mother of two noted, "I had to manage everything alone. There was no one to send food or stay with me after I gave birth of my 2nd son. My parents live far."

Youth, too, experience climate-related disruptions differently. In Rangapani Chara, several boys and young men described leaving school early to seek work in towns. But everyone does not have same level of freedom of movement. Girls often face trouble traveling or getting jobs, which shows how deeply ingrained gender norms still persist. Both men and women face challenges; however, the options they have are different not only because of their environment but also social norms.

Structural inequality and access to land further complicates the Chakma's experiences of vulnerability. Families with smaller or degraded plots are more exposed to crop failure, food insecurity, and economic instability. In contrary, those with formal job or political networks are better positioned to mitigate environmental and economic risks. Bryant and Bailey (1997) in their examination of political ecology of environmental changes in the Third World, argued that environmental issues cannot be

detached from power relations, especially concerning the control of resources, the exploitation of labour, and the validation of knowledge. Drawing on a range of examples from the Third World, they emphasized that inequality is not incidental but structurally rooted in how environmental hazards are distributed and governed (Bryant and Bailey, 1997). In the Chakma instance, these issues disproportionately affect marginalized households, regardless of gender, age, or poverty level.

Vulnerability is further complicated by spatial location within the community. Families living close to schools, roadways, or local markets have more reliable access to buyers, transportation, and utilities (electricity, irrigation facilities, etc.). In contrast, families living far particularly close to hillslopes and mud roads reported being more vulnerable to service gaps and disaster hazards. This spatial imbalance adds a layer of infrastructural vulnerability to already existing gendered and generational stress.

Nonetheless, these impacts are not unidirectional. Some women showed appreciation for earning income, engaging in market transactions, or being visible in new domains. However, they also underlined that these opportunities come with trade-offs such as longer workdays, less time for rest, and reduced community rituals.

Finally, the vulnerabilities faced by the Chakma are neither uniform nor static. They are shaped by interrelated elements and influenced by historical context. They arise at the intersection of sociocultural change, shifts in livelihood, environmental challenges, and history of marginalization. Understanding these layers is crucial to meaningfully documenting climate impacts and acknowledging how transformation is managed through roles, relationships, and strategies that often go unnoticed in policy analysis.

Conclusion

This chapter has explored the impacts of climate change on the Chakma community in Dighinala. While analytically focused on impact, this analysis indicates that these impacts are not solely attributable to climate change and are not experienced in isolation. Taking climate change as a “threat multiplier,” this chapter has presented how climatic changes are exacerbating existing vulnerabilities in relation to livelihoods, ritual practices, social relations, health, intergenerational and gendered disparities. In this sense, climate-related impacts should be regarded not merely as environmental phenomena but as intersections of power, position, and possibility.

Agricultural transitions have resulted in both opportunities and constraints. Fruit orchards have provided income and new livelihoods for many Chakma households. But these changes have increased dependency on markets, fertilizers, and external knowledge systems, for people with smaller plots or limited access to irrigation facilities. The changes have reduced local seed diversity and undermined communal systems of labour exchange, leading to new forms of precarity.

Similarly, the growth of market-oriented agriculture and the reduction of traditional practices have transformed social relations within the community. Intergenerational differences have intensified, as younger individuals often anticipate futures outside the village, whereas older generations express concern regarding the decline of agricultural skills, rituals, and communal life. These, however, are articulated not as absolute losses, but as change in priorities.

Rituals that were connected to farming and seasonal cycles have not disappeared but changed. This shift reflects how the community reshapes its cultural practices to changing realities. Impacts on health and the body reveal perhaps the most intimate manifestation of vulnerability. Changes in diet, health practices, illness patterns, and caregiving have reconfigured how well-being is experienced and maintained. Most importantly, this chapter has highlighted that impact varies according to gender, age, land access, economic status and geographic location. Community members experience impacts differently. These experiences illustrate dynamic negotiations, wherein vulnerability and possibility are in perpetual flux. Findings here, thus, highlight the necessity of employing an intersectional perspective in climate impact research.

Although the loss of rituals, cooperation, and resources has been a recurring theme; what emerges is not a story of breakdown, but of continuity amid constraint. Rituals are scaled down or changed, collaboration persists in more subtle forms, new gendered work roles appear. These are signs of community life changing under various forms of internal and external pressures. Understanding these processes require consideration of environmental factors as well as the social, cultural, and political aspects of everyday life.

Chapter 5: Adaptation Practices of the Chakma Community

This chapter examines the Chakma community's adaptation practices – how they engage with and respond to changes based on their local knowledge and experiences.

Adaptation is analyzed here as a dynamic and socially integrated process. According to the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report 2007, adaptation takes place within "physical, ecological, and human systems" through changes in social processes, risk perceptions, and daily practices aimed at 'mitigating potential harm or capitalizing on new opportunities' (Adger et al., 2007, p. 720). The Chakma's adaptation strategies illustrate this spectrum of both anticipatory and reactive responses. As I indicated in other chapters, climate change does not function in isolation. Thus, the responses also do not occur in isolation. In line with the IPCC's framing, the Chakma's adaptation is not solely about responding to environmental issues but also about navigating socio-economic transformations through practical, situated decisions. They reflect "ongoing process" where climate change and other issues including state interventions, market transformations, population dynamics, cultural change, modern technologies and historical marginalisation, intersect (Crate & Nuttall, 2009; Adger et al., 2007, p. 720).

Recognising these interactions, I move beyond binaries like tradition versus modernity, or environment versus economy. My fieldwork revealed the Chakma are not suspended between a nostalgic past and an uncertain future; they negotiate their present through practical choices. Thus, I employ "negotiated modernity" as an analytical framework for this chapter that helps explain how communities like the Chakma selectively engage with modern influences. As I elaborated in my theoretical and conceptual framework, negotiated modernity is a process by which indigenous and marginalized communities selectively engage with modern institutions, technologies, and cultural flows. Following this framework, I examine adaptation as a dynamic, plural and uneven negotiation driven by local context, necessity and opportunity.

Adaptation is closely linked to adaptive capacity that refers to a community's ability to navigate risks and changes. Such capacity is shaped by various structural, cultural, and socio-economic factors. Among indigenous communities worldwide, including the Chakma, adaptive responses are diverse and context specific. These responses draw on cultural values and lived experience. Some responses are spontaneous, others are the result of pressures or necessity. Yet, all such responses reflect

resilience, agency, and negotiation. I also focus on intersectional and intergenerational aspects of their local adaptation practices.

Resilience remains another key framework here for understanding how communities respond to complex and overlapping factors. Folke et al. (2010) defined resilience as not only the ability to absorb shocks but the ability to adapt and transform in changing socio-ecological contexts. This approach moves beyond static notions of recovery and instead emphasizes flexibility, innovation, and the possibility of deliberate transitions when existing system becomes fragile. Similarly, Ford and Smit's (2004) work on vulnerability in Canadian Arctic communities, argued that resilience is not a natural characteristic of indigenous societies, but a process that emerges through continued adjustment within relatively stable social and ecological systems. They asserted that when these conditions shift too rapidly or unevenly, the capacity for resilience may be compromised (Ford & Smit, 2004). Furthermore, using Crate and Nuttall (2009), I argue that adaptation to climate change is a complicated, culturally embedded process that goes beyond just being resilient and able to adapt. To them, adaptation encompasses not only the management of environmental changes but also the preservation of cultural identity and the ties between humans and their environment (Crate & Nuttall, 2009, p. 12). Such frameworks help me to think beyond simple ideas of resilience and instead examine how adaptation unfolds within settings shaped by both environmental variability and structural constraints.

This chapter avoid idealizing the Chakma as static or inherently harmonious with nature. Rather, it highlights their agency, innovation, and capacity to critically engage with broader forces such as climate change, state development, market dynamics, modernity and development.

Although in their lived experience, perception, impact, and adaptation are interconnected, I examine them separately for analytical clarity and this separation is intentional. Like other chapters, I engaged with community members from varied backgrounds to understand how age, gender, economic position, and life experiences intersect in shaping adaptive strategies. And, also like previous chapters, the issue of representation applies to this chapter as well.

Adaptation in Agricultural Practices

The Chakma have relied on jhum cultivation for generations for their livelihoods. However, changes in weather patterns, particularly, rainfall and temperature alongside declining land availability and increased population have rendered traditional jhum cultivation less feasible. Consequently,

agricultural practices have evolved significantly as an adaptation strategy. Most of the Chakma farmers now cultivate high-yield, climate-resilient crops using modern hybrid seeds such as Thailand's Pajam, Sylheti Pajam, and BINA's 12, 17, and 75. In addition, they use fertilizers and pesticides, tractors and power tillers for cultivation and pump machines for irrigation. As one farmer observed, "nowadays, we do not wait for rainwater as such. We plant two to three times a year, using fertilizers and pesticides." These modern seeds yield faster and more abundantly, offering food security and economic benefits to farmers who previously relied on traditional varieties. Drawing on the transformation in agricultural practices, an elder man with decades of firsthand experience observing and participating in these changes, noted how farming once relied on the labour-intensive practice of ploughing with cattle and buffalo. "Back then, farming families worked tirelessly with little rest. We went to jhum fields early in the morning and would return in the evening" he remarked, shedding light on the physical toll of traditional methods. However, as modern farming tools, technologies and techniques reached the CHTs, these practices have gradually been replaced. Modern equipment has reduced the physical burden on farmers. It has enabled them to cultivate larger areas of land within shorter time frames, and keeping the land cultivated throughout the year. This has further ensured that people have food round the year from their own rice. Even farmers who do not own machinery have adapted by renting equipment, illustrating their willingness to embrace change for efficiency and productivity. Mona Chakma from Middle Banchara described, the expenses associated with cultivation such as renting land, applying fertilizers, using pesticides, and hiring machines, amount to approximately 10,400 Bangladeshi taka for a single season of rice production in a small piece of land. Depending on the quality of soil and care, some lands yields 80–90 units of rice, and others produces 50–60 units, the financial margin remains slim.

Despite the increased cost, farmers prioritize cultivation as a means of sustaining their families and ensuring they remain self-reliant for food staples. They are also adapting planting cycles according to the changed weather. Many farmers have turned to cash crops like mango, papaya, orange, banana, bamboo, and teak. A retired jhum farmer in his mid-sixties, pointed to a cluster of young mango trees as an example of recent changes in agricultural practices during our walk through his cultivated lands. "Now we have to earn money by cultivating fruit orchards", he stated. His statement indicates a shift from subsistence farming to cash crop cultivation - a transformation influenced by both environmental pressures, growing population and market demands.

These shifts reflect a practical response of the farmers to the need for greater productivity and suitability in the local context. While requiring financial and technical investments, the transition to

hybrid seeds, cash crops, and modern farming technologies has enabled the Chakma to cultivate multiple crops throughout the year and better manage climatic unpredictability. “With the company seeds and irrigation facilities, I now plant more than once a year, I produce more food, and faster, though I need to put in more care, medicines and expenses”, reflected by a farmer who has been practicing farming for generations to make his family’s living. During a group conversation in Middle Banchara Rasik Mohan Karbari Para, several farmers discussed how hybrid rice varieties, though initially expensive, had been adopted widely for their higher yields. “With jhum, we waited long, and we remained worried about the weather. Now, with these seeds and some fertilisers, we can harvest more predictably” one of them noted.

Market access has been another critical factor influencing agricultural adaptation. Improvements in road infrastructure have enabled farmers to easily transport produce to Khagrachhari town. During a motorbike journey to one of the remote paras, my local assistant, Keton Chakma pointed out sections of the road recently paved under a government project. “Before, we carried on our head or hand or hired labourers. Now we can take our fruits and vegetables by motorbike or *tomotm* to the market.” This improvement has expanded marketing possibilities, encouraging a shift toward cash-oriented crops like pineapples, bananas, oranges, cucumber and spices that are sold in better prices.

However, these new practices also necessitate increased reliance on fertilizers, pesticides, and irrigation systems, introducing both opportunities and challenges (as I discussed in detail in the previous chapter). Many farmers and community members also expressed concerns about the long-term sustainability of intensified agriculture. The increased use of chemical fertilisers and pesticides, while boosting short-term yields, has raised fears of soil degradation and health impacts. During a conversation with a farmer who was spraying pesticide on his brinjal plants, he commented “it helps control pests, but I worry about the soil and the water.” This awareness indicates that while farmers are adapting to current pressures, they are also concerned about potential consequences of these choices.

On the other hand, the benefits of these shifts are not evenly distributed. Access to hybrid seeds and chemical inputs often depends on cash availability. Thus, poorer households continue to rely on traditional farming methods. Furthermore, while farmers appreciate the income from cash crops like fruits and timber, many also recognise new uncertainties tied to market dependency. Prices of fruits such as mangoes and guavas fluctuate seasonally, and traders often control prices at the farm gate, leaving farmers with little bargaining power. As Mona Chakma remarked, “we plant fruit gardens and

wait for years, but if the market is bad, all our effort feels wasted." I found some families planting fruit orchards and high-yield vegetables leasing land from wealthy families. Some of them has borrowed money to manage farming expenses. They also expressed concern about the price fluctuation in market during the season. Such risks make their adaptation strategies both hopeful and precarious.

The decline of jhum cultivation was described by community members as a rational adjustment to changing circumstances. In discussions with younger farmers, there was an acknowledgment of soil erosion and reduced fallow periods, but also an emphasis on state discouragement of jhum through promotion of horticulture and forestry plantations. The government's role in encouraging transitions to permanent agriculture was repeatedly mentioned, especially in relation to subsidy programs for hybrid seeds and fertilizers.

Many families nowadays have *pushtibagan* (nutrigarden), another example of their response to shifting agricultural landscapes. The concept of nutrigarden (similar to home gardens for household consumptions) was initiated as part of a government-supported project to enable people to grow nutrient-rich vegetables like tomatoes, eggplants, pumpkins, leafy greens, green chilies, etc. on a tiny plot or courtyard. By giving training, seeds, and technical support, the local government has enabled a long-term strategy to ensure food security, particularly for families with smaller plots. Notably, there is no use of chemical pesticides and fertilizers in nutrigarden which underscores the community's reliance on organic inputs like cow dung, ash, and compost, reflecting both their traditional knowledge and their embrace of modern sustainability practices. Though promoted by the then government, I found that many households adopted the practice independently, learning from their neighbours. This demonstrates a blending of state influence with community-driven agency, where Chakma families selectively embraced a state-promoted strategy, adapting it to their needs and capacities.

Additionally, they now practice intercropping, such as planting limes, tomatoes, and eggplants in guava and jojoba orchards to optimize unused spaces in fruit orchards. It demonstrates their innovative use of land and resources. These farming mechanisms not only helps meeting nutritional demands but also illustrates the community's resilience and willingness to embrace new practices in the face of environmental uncertainty. These strategies underscore the community's agency in adopting modern techniques not as a rejection of tradition but as a means to secure livelihoods and meet contemporary needs. These also manifest a negotiated way of their engagement with modern practices to maintain livelihoods.

Importantly, the above shifts in agricultural practices does not mean that the community has completely abandoned jhum cultivation. Many families practice both jhum and modern cultivation. They believe that to live, they must adjust. I recall Jyoty Chakma's statement, "we cannot always farm as we did before, but we also cannot entirely leave our traditional practices." This approach reflects a practical balancing of innovation with continuity, a survival strategy that draws on both traditional knowledge and new opportunities.

The above also demonstrates nuanced agricultural adaptation among the Chakma rather than romanticizing past practices or viewing modernity as inherently problematic. By integrating modern agricultural technologies, they have enhanced food security, expanded income opportunities, and strengthened resilience to socio-ecological changes. These developments demonstrate the initiative of a community that is actively reshaping its agricultural future recognizing both necessity and tradition. This approach questions the simplistic dichotomy of tradition versus modernity, instead emphasizes an integration of indigenous knowledge with contemporary techniques.

Adaptation in Water Management

Water management is another major area where the community's adaptation measures are evident. This covers both family and agricultural needs. The community has carefully combined modern and traditional methods to cope with irregular rainfall and prolonged droughts. My field observations and conversations confirm that while water scarcity persists, especially for irrigation, community responses remain varied and deeply anchored in their everyday realities, shaped by household means, gender roles, and communal initiatives.

For household consumption, water security has improved substantially over recent years. The widespread installation of tubewells, deep tubewells (some reaching 200 to 300 feet) and motorized pumps, have transformed access to clean water. According to the Union Parishad (2025) data, over 70% of households in Dighinala now benefit from tubewell water, either privately or through neighbours. These have significantly reduced the physical burden of water collection, especially for women who have traditionally shouldered this responsibility. A health worker in her late forties, recalled, "my mother and grandmother, along with other women, carried heavy pots on their heads." Sitting in her courtyard, she added with quiet relief, "now, with a simple flip of a switch, water flows; what once required hours now takes moments." Her account underscores physical relief brought by such technologies as well as the transformation in daily routines and household labour burdens.

Nonetheless, socioeconomic disparities in access to household water persist. While many families have installed private tubewells, poorer households still rely on neighbours. I observed many times women and children collecting water from neighbouring tubewells. During my conversation with a woman in Middle Banchara, I learned that her household did not own a tubewell. “We collect water from next door”, she shared, as she carried a metal pitcher back to her home. She further added that her neighbour let them collect water, but sometimes she has to wait when they are using the tubewell. These quiet moments of waiting reveal the uneven distribution of adaptation benefits. Moreover, this variation reflects a wider reality of how economic means influence adaptation practices. Bari et al. (2024) found similar pattern in their study of water commodification in northwest Bangladesh. Their analysis demonstrated that tubewell expansion mostly benefited wealthier families; poorer and indigenous groups are often left out (Bari et al., 2024).

Importantly, some traditional practices still widely practiced. On rainy days, I noticed families putting pitchers, pots, and plastic containers outside to collect rainwater for cleaning and other household needs. This may appear simple however, it serves as backup, especially when power cut hinders motor pump operation or tubewell access becomes challenging during heavy rain or storms. Such practices present the persistence of local knowledge and offer a low-cost adaptive strategy that complements newer technologies.

While household water access has seen significant improvements, irrigation water remains more challenging. Longer dry spells and changed rainfall have driven farmers to adapt creatively through a combination of traditional and contemporary solutions. Private and communal excavation of ponds and maintenance of local streams serve as crucial reservoirs for rainwater harvesting. During my visits to different *paras,* I saw many households having ponds. These ponds are dug strategically near fields or within homestead areas for convenient water supply to agricultural fields. In Rangapani Chara, I met a farmer at his courtyard. At one point of our conversation, he showed me a big pond by the backside of his house. His brothers and he jointly own it. Pointing to the pond, he stated “without this pond, our fields would remain barren.” His words captured the essential role these water bodies play in maintaining agricultural productivity during dry spells. Similarly, I noticed many *charas* collectively excavated and maintained by the community to reserve rainwater. Community people detailed how retaining rainwater in these natural passages supports not only irrigation but also household needs during the drier months. However, access to these water reservoirs reflects socio-economic divides. Comparatively wealthier families own private ponds, while those with fewer resources rely on shared reservoirs. A 48-year-old woman managing both household and agricultural tasks explained, “families

with better resources often construct private ponds. Those who cannot afford private ponds, rely on *charas*; we dig and maintain them together and use them during dry seasons." Her account highlights not only material disparities but also the communal spirit that helps these collective efforts. These adaptations also illustrate the community's capacity to optimize scarce water resources using available materials and knowledge.

In response to changed rainfall pattern and prolonged dry spells, many households have adopted pump-based irrigation to irrigate their fields during the dry season. Some households jointly hire irrigation pumps, while richer families arrange irrigation facilities independently. These responses show how people are trying to utilize their available resources (tools, technology, social capital) to deal with changing weather conditions. However, socio-economic condition and geographic location can make adaptation efforts harder or easier. Households having agricultural land in remote or upland areas face difficulties to avail irrigation facilities because of higher cost and logistical challenges. This shows that environmental needs, financial and infrastructural resources, and location are all things that affect how people respond to water stress caused by climate change.

Based on the above findings, it can be said that water management, in the community, involves a mix of practices rather than a single approach. Traditional methods such as private ponds, shared *charas*, and rainwater collection are still widely used. However, many households now also use contemporary solutions such as deep tubewells and motorized pumps. These choices are influenced by environmental conditions, financial capacities, and social relations. Their involvement with different way of water management reflects a careful consideration of various options; not holding onto traditions uncritically or embracing full-scale modernisation. Instead, they adopt solutions through a nuanced negotiation in relation to local context and their available resources. These efforts, though not without challenges, shed light on the community's capacity to adapt as well as their openness to engage with practical solutions to changing climatic conditions.

Migration and Occupational Diversification

Migration and occupational diversification have become another way of adaptation in Dighinala. In response to changed weather patterns, rising agricultural costs, reduced land availability, growing population and shifting aspirations (particularly among younger people), community people have expanded their options beyond subsistence farming or forest-related activities. What I gathered from interactions and observations across *paras* revealed that migration, particularly among younger generations, has become increasingly common. Many move to cities like Dhaka and Chattogram, for

working in garment factories, service industries, or other urban enterprises. Moreover, many migrate to other areas and cities for seasonal work. During a tea stall discussion in North Pukurghat, people discussed that many households now have family members in nearby towns or even cities for work. A farmer whose son studies at a university in Chattogram, remarked “farming alone is not enough now.” Another person shared that his son works in a garment factory in Dhaka. “My son sends money, which helps us buy fertiliser and his younger siblings’ schooling” he said. These statements capture a pattern that repeated across households. Remittances from urban employment supporting rural livelihoods, enabling families to invest in agriculture, healthcare, improving houses, education for younger children and daily living. For younger population, migration offers not only economic opportunities but also a sense of agency in navigating uncertainties. A young man I met at a local grocery shop, who came home on leave from a construction job in Khagrachhari town, shared his reasoning “there is not enough work here. If we stay only in the village, we cannot manage. Outside, we have better earning opportunity, and we help our families.” His remark reflects the local realities that drives this decision. It is not necessarily a rejection of rural life, but a practical response to its changed context. The adaptation to urban migration has also brought changes in social structures. Families are increasingly dispersed. While younger people live in cities, elders continue to reside in village homes. A karbari in his mid-sixties detailed this transition, stating, “our children have found new opportunities we never imagined. They send money, and we use it to build better lives here.” This reflects a practical acceptance of change, where the benefits of economic diversification are prioritized over nostalgia for traditional structures.

Occupational diversity has increased significantly within the village as well. Families are increasingly involved in small-scale businesses, online business, driving vehicles, running shops, seasonal business, private services, and specialized trades such as mechanics or tailoring. A health worker from Rangapani Chara noted how technology has broadened economic opportunities, “now, people order goods online or sell their products digitally.” This trend, while not widespread, indicates the community's integration of modern technologies alongside traditional livelihoods.

Women are also becoming more involved in this diversification process, although their approaches tend to be more localized. During my observations in the local markets of Dighinala, I saw a significant presence of Chakma women engaged in the sale of vegetables, homemade snacks, and various small household items. In a discussion with one of the women, she articulated, “I grow some of these at home, some I buy from others to sell here. It helps with our household expenses.” Such engagement

in small-scale trade represents an adaptive approach, allowing women to supplement household income.

One key driver of these diversifications is the rising cost of farming. Aria Mia explained the farming now requires machines, fertilizers, and pesticides, all of which are expensive. Many families cannot afford this without additional income from other sources. Migration and alternative occupations thus emerge as essential strategies to mitigate financial risks associated with farming- both traditional and modern.

The state has also played important role in shaping these diversifications. Improvements in road infrastructure, the implementation of rural electrification, and the provision of agricultural extension services have enhanced mobility and increased access to markets. As we navigated the partially paved road connecting Banchara to Dighinala town, Keton Chakma explained that those used to be completely mud road. Now, people can reach the market in less than an hour by motorbike. This infrastructure development has increased access to urban jobs and exchange of agricultural products.

Above analysis shows the community's adaptive capacity, agency and resilience. From the resilience approach of Folke et al. (2010), the Chakma's adaptation through migration and occupational diversification illustrate their ability to navigate the complexities with flexibility and deliberate transition. These strategies though have changed the community's social organisation, allowed families to leverage the advantages of both settings - financial stability from urban jobs and the cultural continuity of village life.

Nonetheless, diversification comes with challenges. Some households effectively incorporate migration and local trades into their livelihood strategy, others struggle due to limited education, lack of social networks, or financial challenges. In the same way, not everyone of the same gender or age group benefits equally from livelihood diversification. Young men usually possess more opportunities for migration in search of work, whereas women and older family members tend to focus on diversification activities at local level. Moreover, migration to urban areas or other cities introduces new forms of vulnerabilities. Many of the Chakma migrants are employed in low-wage, unstable positions in urban settings where they experience higher living expenses and a lack of job security. Migration and diversification in livelihood as adaptation practices, thus, requires careful decision-making, depending on available resources, social networks, age and gendered role. These decisions

reflect their agency and adaptability as the society seeks to protect itself from environmental unpredictability and socio-economic risks.

Indigenous Forestry Management as a Collective Adaptation Measure

Collective management of forestry has been found as another adaptation strategy in Dighinala. It is a combination of state-led forestry programs, local knowledge, and communal labour. While agriculture and water management respond directly to livelihood and domestic needs, forestry practices provide both ecological benefits and alternative income streams. It became clear during my fieldwork that the Chakma do not view forests merely as environmental backdrops but as living spaces of resource negotiation, management, and adaptation.

In recent years, community-driven forest protection initiatives have gained traction, often under the umbrella of state-backed programs like the Village Common Forest (VCF) model. In response to increased deforestation, changed weather pattern (rainfall, flooding, landslides, temperature) and biodiversity loss, they have devised community-based forest management practices. These practices are largely based on traditional ecological knowledge. The community have formed *samajik bon*/ communal forests also known as *Paaraabon or reserve,* which are examples of their collective ingenuity. These forests/VCFs are formed under the leadership of the *mouza* headman. These forests serve various purposes such as preserving ecological balance, preserving biodiversity, supplying timber and fuelwood, and providing essential resources like medicinal plants. Mamtaz et al. (2018) showed similar role of VCFs in their study in CHTs. While passing a VCF on the way to Banchara, Keton Chakma noted that they protect this area together. Cutting of trees or bamboos is not allowed without permission. During a discussion with Jyoti Chakma, who accompanied me in various area walks, explained that the community collectively take the decision and collect resources from the reserved forests. Once or twice a year; and they distribute the resources among the community members equally. With permission from the *karbaris*, poorer or extremely needy families can sometimes get bamboo from the *parabon*. They are also allowed to collect firewood, wild vegetables and fruits without harming the forests. The management of these forests is a shared responsibility. The community works together to protect these forests. They clear the surroundings of the forests during the scorching Chaitra (one of the months of the Bengali calendar) or khora (drought) seasons to prevent wildfires. These areas are also off-limits to hunting to protect biodiversity. These actions reflect a calculated reaction to the threats that deforestation and climatic variability has brought. Their collective efforts further illustrate Ostrom's principles of local self-organization. Ostrom's (1990)

emphasis on adaptive governance highlights how communal resource management can enhance resilience by aligning resource use with ecological limits.

However, it is important to note that the advantages offered by the community forests are not distributed equally among all members of the community. Those lacking agricultural land tend to rely more on forest resources and often participate in small-scale resource extraction to fulfill their basic needs. This reliance highlights the convergence of social vulnerability and environmental adaptation. It also emphasizes the necessity of targeted support to ensure fair access to the benefits of forest conservation.

Here, it is important to note that despite the presence of state priorities for timber species and market forces, the Chakma actively influences the development of community forests in line with their needs and experience. During my interactions with the community members, it was reported that in some areas the local people resisted plantation of timber species in their *samajik bon*, with a preference for mixed planting to balance ecological restoration as well as household needs. Such decisions regarding what should be planted in the community forests is rooted in the community's situated knowledge and understanding of their landscapes. The Chakma's approaches, here, echoes the political economy of adaptation as analysed by Li (2007) in Indonesian highland communities. Li (2007) emphasized how development efforts are not always welcomed by Indigenous people. Rather, they selectively embrace, modify, or oppose changes based on their own material requirements and social logics. She further highlighted how the practice of politics is ingrained in adaptation, where a complex interplay of acceptance, disagreement, and reworking is reflected in strategic interaction with market and state forces (Li, 2007). This selective adaptation shows that community members actively negotiate external models to meet local contexts and priorities. These practices underscore the necessity of integrating local knowledge and context-specific adaptation strategies as well as ensuring the participation of communities on the grounds for effective climate response.

Cultural Adaptations in Food, Rituals and Dress

The community's adaptation efforts are evident in the daily facets of their cultural life. The evolving environmental and socio-economic conditions in Dighinala have led to alterations in practices related to food habits, rituals, and clothing. The changes reflect a systematic incorporation of new components into existing practices.

Food practices such as sourcing and preparation, have changed remarkably as a response to altered agricultural production, declined biodiversity and forest resources, and increased access to market. To prepare *pajonton* during Biju, for instance, many families now purchase vegetables and spices from the local market. There is change in the diversification of ceremonial foods and drinks as well. In addition to traditional homemade snacks such as *pitha*, families now prepare and serve market-available items like noodles, pasta, sweets, biscuits, soft drinks and packaged snacks during festivals. However, change in agricultural practices or market influences are not the only reason behind the changes in food practices. Deliberate choice of the community plays a vital role here. On the one hand, people add new elements and flavours to enhance their traditional festivities. On the other hand, they continue maintaining core practices like *pajonton* and *kanji*. In this way, they continue to express and sustain their cultural identity, while engaging with changing situations.

Another example of their cultural adaptation is changes in clothing. Traditional clothes like *pinon* and *hadi* for women, and *dhuti, lungi* for men continue to be prevalent, especially among older generations and during festivals and ceremonial occasions. However, modern clothing like T-shirts and jeans is becoming more popular, especially among young men and women. From what I observed, such changes in clothing style seem to reflect evolving cultural preference, convenience and growing availability of market goods, rather than being driven directly by environmental change. During my conversation with a young mother who runs a grocery shop and do tailoring, shared, “my mother used to weave mine and my siblings’ clothes for wearing during Biju. But I buy my children’s clothes from the market.” In her words, “it is cheaper, timesaving and readily available.” She further noted “we like our traditional dress, but for everyday wear, market clothes are cheaper and easier to maintain.” Her shop displayed a mix of bright factory-made garments alongside fabrics used for traditional wear, capturing the coexistence of old and new clothing choices. Many also stated that they do not have time for weaving their own clothes. There are variety of machine-made designs available in local markets.

Turning to ritual practices, many Chakma described Biju as becoming even more vibrant and participatory than in earlier years. Celebrations today are enriched by external influences, but they retain their core cultural significance. As Jyoti Chakma shared during a courtyard conversation, “Biju now feels more colourful. People dress nicely, cook more varieties, and even the young people are excited.” As these examples reveal, cultural practices are not simply disappearing under the pressure of modern influences; rather, they are evolving in ways that reflect both continuity and change.

It is important to note that while some changes are linked to climate-related shifts, many are driven by market forces, government initiatives aimed at promoting rural development and changing societal aspirations. The changes demonstrate that adaptation techniques are influenced by various factors, with climate change being one among many.

Housing - Adaptation Through Hybridity

During my visits to different paras, I observed various types of housing structures. Some with bamboo or mud walls, elevated flooring and wooden supports; others featuring a hybrid form with tin roofs, cement floors and brick walls. Each of such housing structures illustrates adaptation that is shaped by ecological pressures, socio-economic status, external influences, and personal choice. This integration of construction options goes beyond the difference between old and new; it addresses the needs of households, available resources, and changing aspirations. Their housing structures also represent their capacity to combine traditional knowledge with currently dominant materials.

Many families explained tin roofs and brick walls as a coping strategy against heavy rainfall and storms. During my conversation with a fertilizer dealer in North Pukurghat, we were sitting in his new brick-wall with mud-floor house that was still under construction. He explained that “bamboo walls need repair every year after the rains. Bricks last longer and save maintenance cost.” However, some people also highlighted the benefits of retaining certain traditional materials. I met some who described bamboo walls as “air conditioners of nature” because it keeps houses cooler in the humid summer.

However, the choices and decisions around housing design or use of materials are not shaped by climate concerns alone. Alongside heavy rainfall or storms, social meaning and generational perspectives also play important role. Tin roofs, cement floors, and brick walls mean not only protection against rain and storms but also reflection of higher social position in the community. I remember Maya Chakma’s brother’s reflection during our conversation. “My son studies at a university. When visited his friends or saw modern houses in the city, he felt embarrassed of our mud house. Now, he is happy with this “*paka bari”* (brick house) he stated pointing to the newly constructed brick house, we were sitting in. His remarks show how city life as well as social and emotional factors influences housing decisions in the village. This also illustrates intergenerational perspectives in housing choices. Often the younger generations lead in adopting those urban-inspired housing design. Financial situation of households plays a role too. Richer families tend to invest in “*paka bari”* as it lasts longer and reflect their social status. Lower-income households, on the other

hand, tend to rely on more affordable materials such as mud, bamboo, wood, or they gradually work on improving their housing condition over time.

Their houses are physical manifestations of their flexible approaches, where innovation and familiarity coexist. Environmental risks, financial resources, generational perspectives, and societal aspirations all influence decisions regarding housing design and use of materials.

Conclusion

This chapter has analyzed the Chakma community's adaptation practices with a focus on the role their local knowledge and experiences play in making adaptation decisions. As climate change interacts with many other factors, I have situated my analysis within a broader landscape of ecological, socio-economic, cultural and structural changes. As shown, adaptation decisions are not always made in response to environmental concerns alone. Instead, it emerges through the intersection of various factors such as market influence, state policies, market influence, access to land and resources, population dynamics, modern technologies, spatial location, and socio-cultural aspirations. Climate change is one factor among many, and people often do not really separate its effects from other changes happening around them. Their adaptation practices, which are based on real-life experiences, demonstrate this complexity.

The analysis above has illustrated how adaptation has taken place across different domains of everyday life. Implementation of new farming techniques and diversification into cash crops has reflected strategies in agricultural adaptation. These responses are not only to changing rainfall but also market demands and population growth. Water management practices have responded to environmental needs as well as socio-economic difference. Migration and livelihood diversification have not indicated a rejection of rural life, rather these are the community's efforts to deal with environmental uncertainty while pursuing social and economic aspirations. Community forestry has illustrated a collective aspect of adaptation, where planting choices and local governance has been informed by ecological restoration and livelihood needs. Cultural elements like food, ritual, and dress have shown how adaptation has extended beyond survival to include the maintenance and reworking of cultural identity. Housing practices have demonstrated the community's openness to integrate contemporary and traditional materials to enhance comfort, durability, and social status.

Drawing on the layered and flexible nature of the Chakma adaptation, this chapter has argued that adaptation is not a binary shift from tradition to modernity. Throughout, the chapter has illustrated

their negotiation – their way of engagement with changes and their selective integration of new approaches and technologies with familiar ones. From changes in farming and water use to housing and cultural practices, they negotiate their engagement through practical choices. In their context, adaptation is understood as a series of decisions informed by necessity, opportunity, lived experience and aspirations, not as a form of resistance or loss. Adaptation in this sense is not binary shift but a layering of old and new; there is a flexible and context-specific form of continuity that expresses agency, adaptation and willingness to embrace new ways. Moreover, the chapter has argued that the Chakma people are not passive victim of environmental changes, but active participant negotiating their place within changing socio-environmental realities. Their adaptation strategies are rooted in cultural values but flexible and open to innovation.

It is important to note that everyone in the community does not respond to the changes in the same way. Access to adaptation options such as irrigation technologies, housing materials, or stable income, depends on various socio-economic conditions. Geographic location, income, and gender influence how adaptation decisions are made. The diversity in adaptation has been evident throughout the chapter. Women, elders, youth, and landless households each navigate adaptation differently. These differences remind us that adaptation is about access as much as it is about knowledge or willingness. In this sense, adaptation is political, driven by resources and power dynamics.

Drawing on Ford and Smit (2004) and Folke et al. (2010), this chapter has suggested that resilience is not inherent but emerges through community efforts and broader structural influences. In the Chakma context, resilience is built not through rigid adherence to tradition nor a wholesale embrace of modernity, but through a flexible, situated negotiation that draws selectively from both. Their strategies demonstrate both creativity and limitation. While they adapt continuously, their resilience capacity is being shaped by external forces out of their control. In addition to existing challenges and vulnerabilities, sometimes their adaptation practices are also introducing new forms of vulnerabilities (as I indicated in migration discussion). Resilience, thus, is a complex, dynamic and relational process. Recognizing this, any support for community-based adaptation need to focus not only on technologies or interventions, but on enabling conditions that will allow people to respond on their own terms.

Finally, situating the Chakma's adaptation strategies within broader anthropological and environmental frameworks, this analysis has shown that indigenous adaptation practices are not only essential for the survival of these communities but also for enriching global discourses on resilience and sustainability. The Chakma case enriches our understanding of adaptation not only in the context

of the CHTs but also contributes to broader debates on community-based adaptation and resilience. It has highlighted the importance of recognising indigenous agency, respecting the complexity of local strategies, and supporting flexible, context-specific and community-driven approaches in policy and practice.

Chapter 6: Conclusion

This thesis sought to understand how the indigenous Chakma community perceive and interpret climate change, and the strategies they follow based on their cultural knowledge and experiences to adapt with the changes. My research question was: how do indigenous Chakma community of Dighinala perceives and interprets climate change, and what role do their local knowledge play in their adaptation practices? Rather than approaching climate as a singular or isolated driver of change, this research has shown how climatic and environmental changes are entangled with broader social, political, economic, and demographic transformations. At its core, this thesis has been an ethnographic engagement with how people make sense of change, how they narrate their place within shifting ecological and spiritual worlds, and how they negotiate possibilities within emerging uncertainties. These questions were addressed across three interconnected yet analytically separated chapters on perception, impact, and adaptation.

The separation of these domains was not meant to mirror lived experience where perception, impact, and adaptation often overlap in everyday life, but to allow for sharper analytical representation. In the process, this study has not aimed to deliver a singular truth or complete explanation. Rather, it has centered the voices of Chakma interlocutors – men and women, old and young, poor and landholding, not as cultural representatives, but as situated individuals navigating transformation through memory, emotion, labour, and reflection. Drawing on extended ethnographic fieldwork across various Chakma paras, this thesis has shown that the perception of climate change in Dighinala is not only a narrative about the weather; it is also a narrative about changing relationships, shifting knowledge systems, eroding social practices, and emerging forms of agency and uncertainty.

The first empirical chapter examined how the Chakma perceive and interpret change. Anchored in the interpretive anthropology of Geertz (1973), the environmental hermeneutics of Fabian (2001) and Utsler et al. (2014), and the work on social and environmental memory by Crate and Nuttall (2009), Roncoli et al. (2009), and Ricœur (2004), the chapter argued that Chakma interpretations are not framed around isolated variables like rainfall or temperature but are embedded within temporal, moral, and cosmological frameworks. Change is not simply seen as loss, nor is it framed in technical or catastrophic terms. Instead, people reflected on change through stories of the past, sensory memories, ritual displacement, and spiritual uncertainty.

The section *Remembering the Past, Sensing the Present* showed how elders compare present-day uncertainties with memories of more predictable cycles, shared rituals, and stable land relations. This does not indicate a simple nostalgia, but a way of measuring transformation through embodied temporality. Similarly, the chapter explored how climate is sometimes interpreted as the Earth's way of responding to human misdeeds - a moral ecology embedded in Chakma cosmology and reflected in rituals like Tammana Puja. Here, belief systems and spiritual repertoires act as interpretive tools, not fatalistic closures. Importantly, the chapter also pointed to the multiplicity and heterogeneity of perceptions. In doing so, the chapter challenged essentialist portrayals of indigenous climate knowledge by emphasizing diverse and intersecting positionalities.

The second empirical chapter examined how impacts are experienced, materialised, and unevenly distributed across the community. While much climate literature tends to isolate environmental impacts on crops, water, or weather, this analysis emphasized that such changes are entangled with broader disruptions in livelihood systems, ritual practices, gendered labour, and social relations. For instance, the shift from jhum cultivation to commercial gardening was not driven by climatic degradation alone, but by a convergence of state policy, market access, population growth, and changing aspirations. The decline of rituals such as *Alpaloni* or *Noa Bhaat* was shaped as much by changed weather patterns as by socio-economic realities. Similarly, social customs like *Malaye*, once a vital expression of mutual aid, have faded under the weight of increasing individualisation, labour commodification, and time constraints.

This chapter did not frame impacts solely as loss. While some practices have declined, others have emerged. Access to drinking water has improved with the spread of tubewells and motor pumps. Women's participation in local markets, although accompanied by increased burdens, has also been seen by some as a marker of independence. Here, impacts have been seen not as a unidirectional erosion, but as a field of negotiation and trade-offs, often marked by inequality.

The chapter also brought in intersectionality as an analytical lens, though not always by name, to show how climate-induced impacts vary by age, gender, and access to resources. Older women, widows, and landless households experience climate impacts differently not because the rain falls differently, but because of structural positioning within households and community. The impacts of climate are, thus, deeply social.

The third empirical chapter turned to adaptation practices, not as a technical category or list of responses, but as a set of situated practices and negotiations through which people adjust, compromise, innovate, and struggle. Drawing on the framework of negotiated modernity, resilience and political ecology, this chapter argued that adaptation can be better understood within the social and historical contexts that shape access to resources, decision-making authority, and the division of labour.

Adaptation also is not uniform, nor is it always empowering. Women entering paid labour, for instance, must balance that work with domestic and caregiving responsibilities. Shifting crop types may provide short-term gains but also expose farmers to new forms of market dependency and ecological risk. The introduction of irrigation technology, while often presented as a climate solution, excludes those without land or capital. In these cases, adaptation acts as both a strategy of resilience and a source of new vulnerability.

This chapter, thus, presented adaptation not as a binary shift from tradition to modernity, but rather as layered and flexible approach. Here, adaptation strategies are ongoing negotiations informed by cultural knowledge, lived experience, necessity and aspirations. Responses are shaped by both constraints and creativity, where cultural continuity and innovation coexist. The analysis also pointed to the generational and aspirational dimensions of adaptation as well.

To sum up, this thesis began with a question about how an indigenous community experiences and responds to climate change. It ends with the recognition that climate, for the Chakma, is never only about the weather or environmental issues. It is about land, work, family, spirits, memory, and the horizon of what a good life might look like. It is lived in sweat, conversation, ritual, and laughter. It is endured and contested in the silence of missed rains, the fatigue of long-day labour, and the quiet resignation or hopeful eyes of those dreaming something different.

This, then, is not a story of decline, nor is it a story of triumph. It is a story of living with uncertainty – with insight, effort, imagination, and constraint. As such, it is not only a contribution to the anthropology of climate change, but a modest invitation to listen more closely to the plural ways in which life continues, adapts, and redefines itself in a world in flux.

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Appendix: Photos from the Fieldwork

Below I have added some photos that I captured during my fieldwork in Dighinala.

A view of paddy fields in Dighinala, central to Chakma agricultural practices.

A household drying paddy on their courtyard

A rain-damaged walking path

Locally grown vegetables and forest produce sold by Chakma women at the Dighinala bazaar.

Leafy greens at the corner of a courtyard supported by bamboo structure

A narrow mud-walkway leading to a household

A mud wall house in Dighinala

An under-construction "*paka bari*"

Segun roots visible above the ground indicating ongoing changes in soil conditions

Walking path cutting through paddy fields to connect households

A small plot of leafy greens by the courtyard of a household

A mixed-fruit orchard in Dighinala

Hookah at a household

Bamboo support over Banchara’s chara to assist crossings by local people

A Chakma woman carried a bundle of firewood to home collected from nearby forests

Tubewell at a household courtyard

A Chakma woman collecting water from neighbour's tubewell

A jhum field

Fruit orchards under the cloudy sky in Dhighinala

Indigenous Community's Cultural Center in Khagrachhari Town

Main road between Dighinala and Khagrachhari Town

During a rain-forced pause on the author’s way home

Moment of shelter at a local tea stall due to rain during fieldwork