Climate Change and Non-Migration: Exploring Place Relations in Rural and Coastal Bangladesh

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Abstract

Increasing environmental stress are becoming a powerful driver of forced migration. Rural and coastal lives and livelihoods in many developing countries, including Bangladesh, are vulnerable to multiple sudden and gradual onset disasters. Growing research and policy interests are the disasters risk reduction and displaced population management.

This qualitative research problematises and expands upon those who are unable and those who are unwilling to migrate through the multidimensionality of place relations. Through 60 semi-structured interviews from four at-risk communities in Kalapara, a rural and coastal hotspot in Bangladesh, the analysis of this study proffers four inter-related dimensions of place relation concerning a) *livelihood opportunities*, b) *place obduracy*, c) *risk perceptions*, and d) social-*structural constraints*. We introduce the multidimensionality of place relations to explain the human-place relationships under increasing environmental stress, which leads to diverse migratory and non-migratory behaviours.

The result of this study represents a fundamental challenge to climate-induced migration approaches and demonstrates the value of voluntary and involuntary components of place relations in understanding migratory and non-migratory behaviour. Our discussion provides insight into how to best support non-migrant households' limits to adaptive capacity and well-being and build more climate and people-focused disaster risk reduction and displacement policies.

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AR6	Sixth Assessment Report
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BDP	Bangladesh Delta Plan
BRRI	Bangladesh Rice Research Institute
CAQDAS	Computer-Aided Qualitative Data Analysis Software
CBA	Community Based Adaptation
CBDPs	Cross-Border Displaced Populations
COP	Conference of the Parties
CPP	Cyclone Preparedness Program
CSER	Centre for the Study of Existential Risk
DCIID	Disaster and Climate Induced Internal Displacement
DDMP	District Disaster Management Plan
DMA	Disaster Management Act
DMF	Disaster Management Framework
EIU	Economist Intelligence Unit
GCRs	Global Catastrophic Risks
GDP	Gross domestic product
GED	General Economic Division
HYV	High Yield Varieties
IDP	Internally Displaced Person
ILO	International Labour Organisation
IMDC	Internal Displacement Monitoring Centre
IOM	The International Organization for Migration
IPCC	Intergovernmental Panel on Climate Change
IRRI	International Rice Research Institute
KNOMAD	The Global Knowledge Partnership on Migration and Development
LVI	Livelihood Vulnerability Index
MMC	Migration Management Cycle
MoDMR	Ministry of Disaster Management and Relief

NAPA	National Adaptation Programme of Action
NDC	Nationally Determined Contribution
NELM	New Economics of Labour Migration
NSIDM	National Strategy on Internal Displacement Management
PNC	Post Normal Science
PSB	Physical Science Basis
RMMRU	Refugee and Migratory Movements Research Unit
SCMR	Sussex Center for Migration Research
SDG	Sustainable Development Goals
SOoD	Standing Orders on Disaster
UK	United Kingdom
UNDP	United Nations Development Programme
UNDRR	United Nations Office for Disaster Risk Reduction
UNESCAP	United Nations Economic and Social Commissions for Asia and the Pacific
UNFCCC	United Nations Framework Convention on Climate Change
UNHCR	United Nations High Commissioner for Refugees
UNOCHA	United Nation’s Office for the Coordination of Humanitarian Affairs
USA	United States of America
USD	United States dollar

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Declaration

To the best of my knowledge and belief, I declare that this thesis is original, and the work described in it has been composed solely by me. The appropriate references and acknowledgements to other researchers have been included in this work. I certify that this work does not contain any material previously approved or submitted for awarding any other degree, in whole or in part. Below is a publication that is part of this work:

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Chapter 1

Introduction and Context

1.1 Introduction

Until December 31st, 2021, disasters had displaced 5.9 million people in 84 countries and territories (IMDC_GRID, 2022), while increased concentrations of greenhouse gases and changes in land cover continued, warming the earth's surface and accelerating global temperature. A 1.5^0C increase in global-mean temperature above the pre-industrial level means more extreme weather events in many places and existential threats to many species (Wan et al., 2019; Safa et al., 2019; Coulibaly, Islam and Managi, 2020). This rate of temperature increase is enormous and devastating, especially in developing countries, due to their over-reliance on climate-sensitive sectors and fewer resources to enhance coping and adaptive capacity (Bhowmik, Irfanullah and Selim, 2021). Adaptive capacity in disaster risk management is often understood as the ability of a system to adjust to the losses and damages from disasters, take advantage of opportunities, and adapt to the consequences (Gallopín, 2006). Regionally, the devastating impacts unfold through slow and gradual-onset disasters and ecological catastrophes; some are experienced gradually, out of sight, over many years, possibly even generations (Glantz, 1994). Incremental changes in the vulnerability of humanitarian crises through loss and damage of lives and livelihoods become apparent after crossing a critical threshold of adaptive capacity (Adger, 2006).

Essentially, vulnerability is conceptualised as a function of exposure, sensitivity and adaptive capacity (Adger, 2006). A system, institutions, individuals and other organisations can be exposed to sudden and slow-onset environmental stress. The degree to which these entities are affected by disasters is known as their sensitivity. Their adaptive capacity is their ability to adjust to potential damage, take advantage of opportunities or respond to consequences(IPCC Glossary, 2018).

In this vulnerability setting, poverty is closely associated with climate vulnerability. Poor people tend to be more exposed to climate shocks and with limited assets and capabilities to adapt. In places with high levels of poverty, people's lives and livelihoods become vulnerable to shocks when they have insufficient real income, wealth, and other previously held endowments fail. Places with poverty, poor governance, limited access to essential services and resources, and high climate-sensitive livelihoods are more vulnerable to climate change impacts (IPCC PSB AR6, 2021). In this context, the impacts of disasters are not just limited to immediate life and livelihood losses but generate multidimensional, short-term and long-term impacts that are often cumulative on the affected people's lives, especially in developing countries. Initial signs of humanitarian crisis induced by changes in the climate are happening now, and managed retreat as a response to increasing disasters in specific locations have been reported in many parts of the world (Hino, Field and Mach, 2017; McMichael and Powell, 2021).

1.2 Adaptation Challenges in Developing Countries

With the escalating threat of climate emergency, governments of the more responsible countries are struggling to build and implement local, national and global policies to ensure the temperature rising cap (below 1.5^0C) and transform towards mitigation and adaptation. Emissions are rising, while the threat is imminent and global. Rural disaster-prone areas of developing countries like Bangladesh, where most households still rely on work in agriculture, fisheries and tourism, but in addition to mitigation, the impacts of climate change are already being severely felt. Lives and livelihoods are highly vulnerable in places like the hotspots of Bangladesh, and communities are being pushed from their homes by disasters (Haque, Parr and Muhidin, 2020; IMDC, 2022). Hundreds of millions are expected to face impoverishment and conflicts and become displaced internally and beyond borders (Goodwin-Gill and Mcadam, 2017). They desperately require strategic and financial adaptation support.

Scientists have recommended that the policy implementation authorities must urgently draw a strategic response to sudden-onset disasters, i.e., cyclones, floods, landslides, as well as gradual-onset disasters, i.e., temperature rise, drought, salinity and precipitation

change (Hugo, 1996; Hunter, 2005; McLeman, 2009; Black et al., 2011; Kniveton, Smith and Wood, 2011; Chen and Mueller, 2019). However, despite dire cries of urgency from the scientific community, the 26th Cooperation of Parties (COP26) has shown how challenging the task is (Mannan, Huq and Khan, 2021). In COP26 meetings, science has been featured in making decisions. In the Glasgow Climate Pack, global leaders aimed to limit global warming to 1.5^{0}C above pre-industrial levels to accelerate decisions into action. Similarly, it was demanded to implement commitments under the Paris Agreement in COP27 (in 2022) and accelerate global action towards achieving a sustainable, resilient, and low-carbon future. However, continuous unsustainable resource exploitation and environmental negligence permanently alter the ecosystem, meaning global emission is yet to decline, which is required to stop immediately, rapidly, and urgently (Rehman et al., 2023).

Scientists have also warned that extreme weather events can result in 143 million migrants in Latin America, sub-Saharan Africa, and Southeast Asia by 2050 (Rigaud et al., 2018). The changes in the human-place relationship are one of the consequences of climate change, meaning affected people who remain in an at-risk place are forced to rethink their relationships with their place. Concerns are intensifying among migration scholars and adaptation practitioners in regard to forced migration that is driven by multiple-hazards – climate change but also conflict, socio-economic unrest and ecological collapse (UNFCCC, 2017; Owain and Maslin, 2018; Haas, Castles and Miller, 2019; Krzanowski, 2021; Andreotti, 2021). The United Nations High Commissioner for Refugees reports that the number of people forced to migrate worldwide has almost doubled in the past decade, reaching a current estimate of 79.5m – more than one per cent of humanity (UNHCR, 2021; IMDC, 2021). It is essential to improve our understanding of the emerging vulnerabilities of climate change, as it has intensified in the last decade, and most countries' emissions reduction targets have failed so far. The consequences of this failure are no longer abstract future risks but a failure that 'may have ratified the doom of vulnerable countries'(Monastersky and Sousanis, 2015).

1.3 Climate change and Bangladesh

According to the World Bank, many places in South Asia are at their initial stages where changes in average climate have negatively affected their livelihoods and living standards (World Bank, 2010; Hoque et al., 2019). Despite producing only 0.56% of the global emissions, Bangladesh ranks seventh on the list of most vulnerable countries to climate change (Eckstein, Künzel and Schäfer, 2021). It is also worth pointing out that most of the land area (some 40 of 64 districts) is environmentally at risk in Bangladesh (Marshall and Rahman, 2013). Ninety million people, or 56% of its population, live in high-climate exposure areas, with 53 million subjects to "very high" exposure (Moran et al., 2018). Although Bangladesh has always been a disaster-prone country, the heterogeneous effects of environmental change and the country's limited capacity to adapt have made their livelihoods more vulnerable (Kulp and Strauss, 2019). The coastal areas and islands are experiencing the effects of sea-level rise, for example, intense coastal erosion and salinity intrusion in the farmlands. Also, increased frequency and intensity of cyclones have combined effects as storm surges and flooding. Homes, roads, schools, markets, and hospitals remain flooded for months, year after year. The increasing impacts of all these disasters are being noticed in security, development, health and wellbeing. For example, rice cultivation occupies 77% of all cropland, employs 65% of Bangladesh's labour force, and provides 95% of all food grain consumption (Xenarios et al., 2015). The majority of these households produce rice, but only a modest portion sells it – the great majority consume all that they produce (Duncan et al., 2017). The livelihoods of these subsistence farmers are more vulnerable than those who produce rice to sell.

The current temperature is already approaching critical levels during the susceptible stage of rice plant growth in March-June (Ministry of Foreign Affairs of the Netherlands, 2018; Mojid, 2020), and along with this, 80% of farmers reported that crops and livestock production is suffering from unseasonable rain, limited availability of surface water and depletion of groundwater (World Bank, 2010; Aryal et al., 2020). Moreover, changes in the climate threaten a loss of annual Gross Domestic Product (GDP) of 2.0 to 9.0 per cent by 2050 and the end of the century (World Bank, 2011;

IPCC PSB AR6, 2021). For context, soil salinity in the coastal regions has increased by about 26% over the past 35 years (Das et al., 2020b).

The coastal fisheries of Bangladesh are also being affected by the impacts of climate change, i.e., floods, coastal erosion, cyclones, and storm surges damage aquaculture infrastructure by destroying polders, causing saline water intrusion and increasing the temperature of water (Khanam, 2017). Low-lying lands in the tidal flood-prone regions, where increasing salinity forces the aquaculturists to terminate farming or change to more saline-tolerant species. Polders and embankments along the coast are described as a 'man-made disaster' by adding more to their existing vulnerabilities, i.e., water-logging within polders, depletion of open freshwater fisheries, sedimentation of river channels, reduced fresh diversity, loss of navigable routes, and higher rates of disease transmission (Thomas, 2020). Marine fishers operating in the Bay of Bengal are also being negatively affected. More cyclone means either more number of days out of work and borrowing more money to survive or fishing in the sea ignoring cyclone warnings. The coastal population is expected to suffer a loss of 1.7 billion USD by 2050 (Das et al., 2020a). Staying longer at home due to cyclones and borrowing from local money lenders adds to their existing poverty and security (Uddin et al., 2019).

Other studies suggest that employment strategy is deeply linked with disaster exposure, where households experience the impacts differently based on their type of livelihoods and the level of dependency on the exposed environment (Guiteras, Jina and Mushfiq Mobarak, 2015). Disaster-affected farmers shifts from farm to nonfarm livelihoods as a coping strategy to tackle short-term reductions in their total household income (Eskander, Fankhauser and Jha, 2016). Nonfarm livelihood activities in the context of coastal Bangladesh are small enterprises such as corner shops, pop-up stalls, carts in the coastal markets, pulling vans and rickshaws, bike cabbing, etc. These forms of livelihood activity are also heavily exposed to the impacts of disasters. Coastal erosion makes the market move farther inland, storm surge demolishes infrastructure, and it remains flooded for weeks. Taking goods to a safer place during cyclones is also a significant challenge for these small entrepreneurs in the beach markets. Business opportunities remain closed for days, if not weeks and these people have to deplete their

capital, sell livestock cheaply or borrow from local money lenders, which pushes them further into debt. The research predicts that if the frequency and magnitudes of disasters increase, the security of these people's lives and livelihoods will likely worsen soon, where displacement will be inevitable.

1.4 Migration from and into Bangladesh

It is undeniable that internal and international migration plays a significant part in building Bangladesh's recent history. An estimated 10 million Bangladeshis are currently working abroad, primarily as low-skilled labourers and pumping $12 billion a year into Bangladesh's economy (Moniruzzaman and Walton-Roberts, 2018a). Research estimates that the number of international migrants was above 600,000 annually, and remittances were more than 6-8% of GDP in 2020 (KNOMAD, 2021). Labour migration to the Middle Eastern countries and South East Asia have become the dominant destinations of migrants from Bangladesh. A total of 217,669 Bangladeshi migrant workers went to different countries in 2020 (Siddiqui and Billah, 2020). The Government of Bangladesh's 8th Five-Year plan (2021-2025) was drafted to achieve the goals of SDGs by accelerating GDP by creating employment opportunities beyond borders. It was reported in the news that along with creating livelihood opportunities within the country by itself to eradicate extreme poverty, the government of Bangladesh is working closely with other countries and set the target to send one million workers abroad in 2022 (Shehab Sumon, 2022).

There is very little data about the number and destination of Bangladeshi diaspora members. However, it is evident that migrants from Bangladesh are inclined to live permanently in North America and European countries (Nur Nobi, Arif Billah and Jannat, 2021). Financially solvent and educated citizens in Bangladesh seek to migrate permanently to socially secure countries while maintaining 'transnational ties' with the host and the country of origin. Almost a decade-old data suggest that more than 7.8 million people of Bangladeshi origin were living in 89 countries of the world in 2013. The diaspora members play a prominent role in some host countries' socio-economic and political systems. For example, an ILO report estimates that the Bangladeshi

diaspora in the UK and USA represents just 12% of the total migrant population contributing about 20% of the total remittance (ILO Bangladesh, 2015). This means Bangladeshi diaspora members also contribute to resource mobilisation, remittances, and investments in the country of origin.

Bangladesh has a long-established seasonal pattern of temporary rural worker movement to nearby cities within the country. Adult males from destitute and poorer households migrated seasonally to the cities between the planting and harvesting seasons when demands for labour went down. These seasonal migrants work in rickshaw pulling, construction companies, garment factories, and many informal sectors in the city and send remittances back to their homes. However, the dramatic shift from agricultural to industrial production and households from areas exposed to severe environmental stress have accelerated pre-existing high urbanisation rates (Brown, 2008a; KNOMAD, 2021). Young populations are more likely to migrate to Dhaka and other core urban centres to secure livelihoods. This phenomenon enforces rural-to-urban migration when drought and inundation become more frequent and longer. During the monsoon, when coastal and river erosion becomes severe, households lose homes and farmlands and are forced to migrate to either nearby villages or cities. The coastal belt of Bangladesh offers a prime example of this kind of displaced people taking shelter in the informal settlements in nearby cities.

Geographically, Bangladesh is situated within the Indian sub-continent, where three sides are bordered by India and the Bay of Bengal in the south. The migration of people from Bangladesh to India goes back centuries. Just in the last century, the partition of India in 1947, on its eastern side, led to the partition of Bengal predominantly based on religious lines, where the Hindus were the dominant population in West Bengal, became a dominion of India; however, considered ethnic minorities in Bangladesh, then East Pakistan. The partition of India displaced between 10 and 20 million people and is often described as one of the largest refugee crises in human history. In its eastern part, the immediate aftermath of the partition displaced well over two million from East Pakistan to India (Sengupta, 2011). The liberation of Bangladesh in 1971 resulted in another over 10 million people fleeing, fearing persecution by the Pakistani military and its Islamist

forces from Bangladesh to India (UNHCR, 2000). It did not stop there. The minority communities of Bangladesh, mainly the Hindus, have migrated to India after facing communal tension and religious discrimination in the society and policy of Bangladesh (Kumar, 2020).

There is no reliable data on the number of foreign nationals who migrated to Bangladesh. However, according to UNESCAP-cited data by Statista, over 1.5 million foreign nationals migrated to Bangladesh. Among them, it can be anticipated that almost a million are stateless Rohingya refugees, and the rest of them are highly-skilled migrants who work in the garment, export processing zones, heavy construction companies, and non-government organisations (UNESCAP, 2018; Sadat al Sajib, Islam and Sohad, 2022). Within this scenario, people are migrating not voluntarily, not for remittance, but because they are forced predominantly due to increased environmental stress.

1.5 Present and future of climate-induced displacement in Bangladesh

As noted in the 2022 IPCC report, due to environmental change, coastal areas worldwide will increasingly suffer from the impacts of coastal erosion, salinity, storm surges and inundation (IPCC PSB AR6, 2021). One of the sufferings is putting millions of people at risk of displacement. Government and humanitarian agencies require good-quality assessments of displacement risk and the factors that shape patterns of risk. Within South Asia, Bangladesh stands as the most vulnerable to climate change: 4.1 million were displaced as a result of disasters in 2019 (2.5% of the population), 13.3 million could be displaced by more intensified disasters in 2050, and 18% of its coastland will remain inundated by 2080 (Khan et al., 2021). The country's topography contributes to its high level of climate vulnerability. Bangladesh is about 80% flatlands, and 20% of it is less than one meter above sea level. Coastal Bangladesh consists of 19 districts and is particularly vulnerable to sea-level rise, salinity, cyclones, and inundation. One possible way to manage such large-scale displacements is through "managed retreat", referring to the relocating groups of households away from at-risk areas (Tubridy, Lennon and Scott, 2022). The following maps show that a one-meter

sea-level rise can make 15 million people homeless in the coastal regions of Bangladesh. The regions are already highly vulnerable to sudden and gradual environmental stress called climate hotspots.

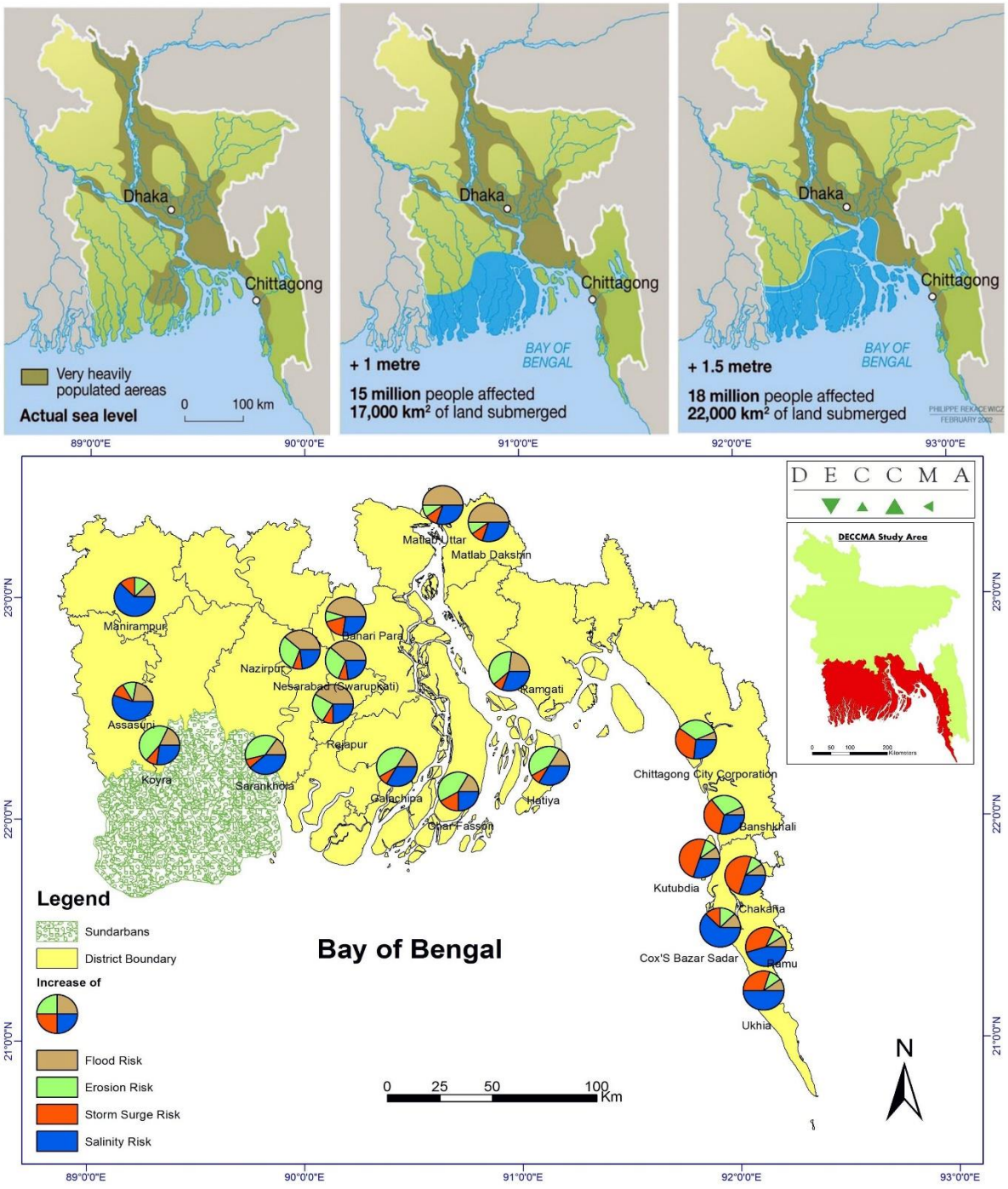

Figure 1.1: Above maps show the projected coastal land submerged in case of 1 and 1.5-metre sea-level rise (Ministry of Foreign Affairs of the Netherlands, 2018) and below the Multi-hazard map of Bangladesh by 2100 (Kabir et al., 2016).

Bangladesh's capital Dhaka is one of the biggest megacities in the world, yet it will not be able to accommodate over ten million displaced people predicted to arrive over the next decade or two. Other district-level towns and cities across the country that are less affected will not be able to transform to become migrant-friendly. So, the option left is to seek refuge beyond international boards, especially in neighbouring countries. Effective policies need to be developed, and systems are urgently needed in place to manage the imminent internally displaced people (IDPs) and cross-border displaced populations (CBDPs). However, before households get displaced, people who live in at-risk areas are prone to face damaged buildings, destroyed crops, lost lives and livestock, destruction of crucial ecosystems, loss of culture, and damage to health and wellbeing. The visibility of climate-induced displaced households in urban slums is already on the rise, and if the global current climate change scenario continues to escalate, the large number of the displaced population is highly likely to threaten local, regional economic, social and political stability.

1.6 The research problem

As a highly populated, fast-growing, and disaster-prone country, studying human mobility in Bangladesh is challenging. Maybe, it is possible to estimate the number of people who have moved in and out, but the complexity arises when exploring the pull and push factors that determine their migratory behaviour. While climate change is a global phenomenon, many studies suggest that the impacts of increasing sudden and gradual-onset disasters are not the same globally or regionally (Mikulewicz, 2018; Arnell et al., 2019). It is grounded locally, which means the exposure, sensitivity, and adaptive capacities are very different from one village to another. Even in one community, not every household is equally sensitive to the same exposure or the impacts of environmental disasters. What it means is that the impacts of gradual-onset disasters unfold as a form of 'slow violence', violence that 'appears gradually and out of sight, a violence of delayed destruction that is disbursed across time and space, an attritional violence that is typically not viewed as violence at all (Nixon, 2011; Dehm, 2020). As each household is differently sensitive to the same set of disasters, their

adaptive capacity is different too. So, their migratory decision-making is non-linear. Some researchers and policymakers question the linear association between climate change-induced disasters and migration (Brown, 2008a; Grecequet et al., 2017). In reality, how gradual-onset disasters shape patterns of household climate vulnerability merits closer attention by scholars and policymakers to better understand the non-linear association of migratory decisions.

Understanding environmental migration, forced displacement, or climate-induced displacement has contributed to drawing targeted policies on climate-induced human mobility. It is assumed that if people think and act rationally, then at some point in an increasing loss and damage scenario, severely affected households fail to adapt and consequently migrate somewhere at least environmentally safer (Franklinos et al., 2021). According to conventional disaster risk management scholars and policymakers, rational individuals should be able to keep themselves informed about the disaster risks they are in and decide how threatening the risks are for them and take migratory or non-migration decisions (Ratnayake, Abdelmagid and Dooley, 2022). Yet, some individuals might be able to make such a decision at the right time, but if the vast affected population faces the same set of disasters and think the same way, migration decision could be expected to be uniform. However, the study indicates that most households remain, and the reason behind this is their incapacity to migrate, which suggests there is heterogeneity in the way people are exposed to the same set of disasters (Mallick and Schanze, 2020). Not everybody affected is equally sensitive to the impacts and has different levels of adaptive capacity. Heterogeneity in the way affected people make migratory or non-migratory decisions is one of the critical challenges to studying this migratory behaviour.

The complexity of defining disaster-induced drivers from other socio-economic and political drivers is challenging. Disaster-induced drivers of migration, especially within coastal and rural communities in developing nations, are intertwined with the development and socio-economic and political policy practices. Individuals of households migrate for various reasons rather than just responses to increasing environmental stress. In the case of migration from highly at-risk environmental stress,

it cannot be confirmed that there is no link to disasters. Rather, migration in this condition is more logical to frame as an adaptive response to increasing loss and damage from disasters (Black et al., 2011; Vinke et al., 2020). Some people have been displaced by increasing environmental stress, and some have not.

Migration receives more attention than non-migration in academic and policy circles. The remaining households require greater research scrutiny because, in an increasingly at-risk condition, these non-migrants may exceed their threshold of adaptive capacity and become displaced in the near future. It is a question of whether these decisions are induced by environmental disasters or (a combination of) other factors. There is an emergent research agenda exploring the journey of those who are either *voluntary immobile* (Wiegel et al., 2021) or *involuntary immobile* (Ayeb-Karlsson, Smith and Kniveton, 2018; Zickgraf, 2019; Mallick and Schanze, 2020), or as *trapped population* (Black and Collyer, 2014) in response to environmentally induced risks.

The 'trapped population' often refers to those individuals or households who cannot leave, usually due to financial or health reasons. Often this translates into those who are willing but do not have the capacity to act on their migratory decision. This thesis will argue that there is a need for further research into this behaviour of remaining in a place that is at risk. The trapped population simplify and make partial assumptions about this non-migration behaviour. As a result, policies do not address the range of issues which typically leads to a significant gap in understanding disaster risk management. The resulting overarching aim of this thesis is, therefore, to find an answer to the following research question:

> *Why do affected households remain under conditions of increasing environmental stress?*

1.7 Aims of the thesis

The documented aim for Bangladesh is to minimise loss and damage and manage mass displacement from the impacts of environmental disasters (SOoD by MoDMR, 2019; NSIDM, 2021). This thesis aims to problematise and explore the experiences of non-

migrants living under conditions of both sudden and slow-onset disasters through qualitative exploration of increasing at-risk households in Bangladesh. In order to address this research aim, the study examines the features and processes of local human-place relationship that functions in environmental risk perceptions; social, economic and psychological attachments; and how these translate into the non-migratory attitude and behaviour of the at-risk households.

Through qualitative analysis, the study explores both voluntary and non-voluntary attitudes toward human-place relationships through the lens of *place relations* – contributing to the emerging literature on the social and economic geography of disaster risk management responses within climate-vulnerable households. While this thesis focuses on Bangladesh, the research has a wider global resonance. Much of the existing research on non-migration falls within the discipline of social psychology- exploring the range of social and psychological choices available in normal environmental conditions. However, critics have argued that migration and non-migration are influenced by many socio-structural, cultural, aspirational, and adaptive capacities that are directly and indirectly linked with disasters (Farbotko and McMichael, 2019; Diener and Hagen, 2020).

This thesis accepts the challenges to synthesise the existing theories of migration and non-migration and adopts a framework so that human attitudes can be studied as the risks from environmental stress increase. The thesis makes theoretical and methodological contributions through a qualitative approach to investigate attitudes and aspirations toward non-migration. A semi-structured interview questionnaire is designed to reveal the dilemmatic changes in human-place relationships. To the author's knowledge, the field of migration and non-migration research is dominated by certain approaches, i.e., quantitative, while thematic analysis categorises the aspirations and attitudes contributing to non-migratory decisions (Ahsan et al., 2022).

The thesis also makes empirical contributions that challenge why households remain in an increasingly at-risk condition is incorrectly framed under 'trapped population', which assumes the households are simply unable to migrate. Instead, this thesis shows that in Kalapara, a climate hotspot, the remaining households have a mixture of

voluntary and non-voluntary relationships with their place despite being at risk of a stressful environment. In this way, a new and more sophisticated understanding of the human-place relationship of an at-risk place is facilitated. Policy-related contributions follow from the empirical findings and relate to how findings from the thesis can shed light on internal and cross-border displacement policy development.

1.8 The structure of the thesis

The thesis is structured as follows: upon introducing the context in the first chapter, in **chapter 2,** this thesis presents an integrative literature review which initially relevant to the research problem of climate-induced forced migration and non-migration (Cabral and Dhar, 2018; Lonkila and Kaljonen, 2021). Then it reviews existing research on human-place relationships in normal environmental conditions and then narrows down the focus to examine the literature on non-migration under increasing environmental stress. It also considers the literature on risk perceptions and socio-economic and psychological attachments with a place. It studies existing literature on the 'trapped population', which falls within non-migration under increasing environmental stress. After all the relevant literature is reviewed, fundamental gaps are highlighted, and research questions are formulated to address the research gap. The chapter finishes by outlining the analytical framework based on place relations adopted for the thesis.

Chapter 3 introduces a contemporary scenario around the migration and development of Bangladesh. This is relevant to understanding the other reasons that make people migrate within and abroad. Then the thesis narrows its focus on climate-induced migration and immobility to explore who migrate predominantly due to environmental stress and who do not migrate from the same community. We then introduce the physical and human geography of Kalapara and explains why it makes an ideal place of study. This chapter also explores the dominant livelihoods, culture and language of Kalapara. Understanding the language is vital because the households do not use English or Bangla academic terms. They have local dialects to describe the phenomenon, and it is crucial to understand and relate the local terms with the academic

terms. Then it explores extant literature on disaster profile, local exposure, nature of vulnerabilities, and adaptive capacity of Kalapara.

Chapter 4 focuses on the methodology of the study. It specifies the level of study, ethics, and data collection strategy. It also justifies why and how the questionnaires have been framed the way it is. The chapter then explains why thematic analysis is used to study the collected data, followed by a description of how the interview responses were sampled and the procedure for sorting the themes. The study concludes this chapter by familiarising the data.

Chapter 5 is the first empirical chapter concerned with the outcome of the investigation. The chapter documents the responses to the interview undertaken in Kalapara in the winter of 2019. It presents the emerging themes of place relations and categorises them into components. Later, the chapter accumulates the components based on existing overarching human-place relationship theories and presents them as the dimensions of place relations. Quotes from the interview data complement each theme and dimension.

Chapter 6, the second empirical chapter, presents how each dimension can be useful to identify the limits of adaptive capacity, leading to freedom to choose rather than being forced to make migration decisions. The themes of place relations demonstrate how different vulnerabilities, perceptions, uncertainties, and attachments contribute to non-migration decision-making. The second part of the chapter is mainly the discussion chapter of the thesis. It reviews Bangladesh's existing climate-induced disaster management policies and highlights gaps to which the findings of this thesis can contribute. Later it also briefly synthesises the suitability of the research methods for addressing the research questions by relating to the literature review and recommending how the thesis results fit with the relevant literature. The chapter also discusses how the new concept of place relation can contribute to existing global policy debate around internal and cross-border displacement, climate-smart local development, and informed adaptation.

Chapter 7 is the concluding chapter, which summarises the thesis. It also briefly discusses the theoretical, empirical, methodological and policy contributions. This

chapter then confers challenges and concludes by proposing opportunities for further research.

Chapter 2

Literature Review

2.1 Introduction

This chapter covers the relevant literature on migration and non-migration theories which explore natural and stressful environmental conditions. Moreover, after revealing some critical gaps in the field, this chapter introduces the research questions throughout this thesis. The chapter introduces the research problem by concentrating on how the academic literature has framed migration and non-migration under natural and increasing environmental stress. This review brings together literature from the following four bodies of knowledge related to migration.

First, we explore the nature of human-place relationships in natural environmental conditions because people have been migrating since the beginning for various reasons. On the other hand, people have been settled in a particular place since the agricultural age. So without looking at how the human-place relationship functions in *natural environmental conditions*, our understanding of why people do not migrate in a particular condition will not be comprehensive enough to conclude. In this sub-theme of literature review, we explore existing literature *on why people migrate in natural environmental conditions*. Theories on migration are universal; however, why people migrate from a particular region is deeply embedded in its social, economic, cultural and political conditions. Therefore, as the core research question empirically explores rural and coastal households of Bangladesh, the focus of attention is on theories relevant to the contemporary migration scenario of Bangladesh.

Secondly, to understand why people remain, we must explore existing migration literature on *why people migrate when the environmental stress are no longer natural for that area*, which means when vulnerability to extreme weather events adds additional risks to lives and livelihoods, then what are the processes in which

households take migratory decisions. Specifically, does environmental migration happen because of the stressful environment, or is it interlinked with other factors? In this section, we try to understand how existing theories are studying the phenomenon of environmental migration.

Thirdly, the above two sets of literature explore why people migrate under natural and changing environmental stress. This section explores the literature on *why households do not migrate under natural environmental conditions*. To explain where people live, why do people live there and not somewhere else? Exploring this question helps us understand the research question of non-migration.

Finally, above three sets of literature on why people migrate under natural and changing environmental stress and why people do not migrate under natural environmental conditions, we now explore existing literature on our research question: *Why do households not migrate from increasing environmental stress?*

Associated Questions	Bodies of Literature	Critical areas of literature (search keywords)
Section 1 **Why do people *migrate* under natural environmental conditions?**	Theories of migration in natural environmental conditions	Set 1. New economic theories of migration Set 2. Labour theory of migration Set 3. Rural-to-urban migration
Section 2 **Why do people *migrate* under environmental stress?**	Theories of migration in stressful environmental conditions	Set 1: Migratory behaviour Set 2: Livelihood vulnerability Set 3: Migration as adaptation
Section 3 **Why do people *not migrate* under natural environmental conditions?**	Theories of non-migration in natural environmental conditions	Set 1. Place attachment Set 2. Sense of place Set 3. Place utilities Set 4: Place dependency Set 5: Place relations
Section 4 **Why do households remain under increasing environmental stress?**	Theories of non-migration in increasing stressful environmental conditions	Set 1. Being used to the slow onset changes and their impacts (slow violence). Set 2: Limits of adaptive capacity

Table 2.1: Design of the literature review.

This multidisciplinary approach to the literature review is necessary because there are many aspects and reasons for migration, and many disciplines study migration from different points of view. Most of this existing migration literature focuses on why, how, and when an agent migrates, for example, for economic, political, or environmental reasons. However, more limited literature focuses on those who remain under increasing environmental stress. For those who stay, the study needs to explore how livelihood vulnerabilities threaten human-place relationships, leading to decreasing solid relationships with the place and determining whether or not to migrate. Climate-induced non-migration is still an emerging phenomenon that demands multidisciplinary exploration to identify its complex relationships with the environment, livelihoods, and many other social, psychological, and economic aspects. These aspects are related to well-established questions about the dynamics of human-environmental relations.

This study only reviews qualitative, quantitative and mix-methods studies on migratory and non-migratory decisions published in multidisciplinary peer-reviewed journals, case studies, and cohorts from anywhere in the world. It uses Scopus, web of science, and google scholar databases to reach the existing literature. The review uses topic-based strategies to design each set of keywords (search terms) to get relevant articles from inception to 30th April 2022.

For example, to reach the first set of literature (Section 1 in Table 2.1) on Scopus, it uses the following combination of search terms: a) {new-economic} AND migration AND Bangladesh or {south asia} b) {labour migration} AND Bangladesh c) rural AND urban and migration and Bangladesh and select "Article title, Abstract, Keywords." The study uses the same search terms for google scholar. The reviewer searches information sources and assesses identified studies for inclusion. A final list is produced for the literature review, and if the title and abstract include the search terms, the full text is reviewed thoroughly.

This study uses a similar literature review methodology for each body of knowledge to understand migration and non-migration scenarios under Bangladesh's natural and increasing environmental stress. Reviewing these four sets of literature to improve our understanding of 'why households remain under increasing environmental stress?'

provides a comprehensive epistemological understanding of the migration and non-migration phenomena under natural and increasing environmental stress.

2.2 Theories of migration under natural environment

Migration has been a constant feature of human history. There are sets of social, economic, political, and environmental factors which build the push and pull phenomena and define certain types of migration. Individuals' contexts, attitudes, aspirations, and behaviour also determine many migration theories. For example, industrialisation and urbanisation have accelerated human migration. Also, faster and more comfortable transport facilities have helped more humans migrate. For economic reasons, better and diverse livelihoods have predominantly attracted or pushed people from agricultural areas to industry and commerce centres (Castelli, 2018).

There are many categories of migration that are shaped by different disciplinary perspectives and objectives. However, in a broader sense, migration can be categorised based on *distance* and *political boundaries*, i.e., within a country and internationally. It can be categorised based on *length of time*, i.e., temporary and permanent; in terms of *purpose*, i.e., study, labour, business; and in terms of *willingness*, i.e., voluntary and forced. Migration can be illegal, unauthorised, irregular, undocumented, smuggled, trafficked, and many others (Haas, Castles and Miller, 2019). Every category can be broken down into sub-categories to study a more specific group of people. For example, forced migration can be categorised under refugees and asylum seekers. It is still unclear how to categorise people who may or may not be fully but mostly forced to leave their homes due to environmental stress.

Scholars from sociology, geography, and economics have attempted to explore this complex migration phenomenon. Ravenstein, in 1885, came up with some generalised laws of migration which are helpful even today (Ravenstein, 1885). Unfolding the current of migration in the UK back then, the author suggested eleven laws that show why immigrants typically move, the distance they move, and their characteristics:

I. The majority of people who migrate only travel a short distance. This can be classified as Friction of Distance.
II. Migration proceeds in steps
III. Migrants who travel long distances are more likely to prefer areas that are great centres of commerce or industry.
IV. Each current of migration produces a compensating counter-current.
V. People in rural areas are more likely to migrate than people in cities.
VI. Men migrate over longer distances than women.
VII. Most migrants are young adult males; families rarely migrate out of their country of birth.
VIII. Large towns grow more by migration than by natural increase.
IX. Migration increases in volume as industries and commerce develop and transport improves.
X. Migration is mostly due to economic causes.
XI. Women are more likely to migrate within the local area.

Scholars have also attempted to conceptualise migration and developed models to project, analyse and suggest policies. Gravity models are one classic example of this kind that states the volume and distance of migration between any two interacting centres. Stouffer modified and took this model further and empirically examined the advantages and disadvantages of migration (Stouffer, 1960; Wadycki, 1975). In the late 20th-century migration study, Everett Lee also explored positive and negative factors associated with the place of origin and the destination that aspire and repel an individual from taking migratory decisions (Lee, 1966). Lee argues that migration is the net result of the interplay among all these factors, and it is never an entirely rational decision. The act of migration is a combination of an individual's thresholds of sensitivities, intelligence, and awareness which are not just a simple calculation of +'s and –'s. However, Lee also argues that individuals involved in migration have a near-perfect assessment of origin factors due to living there for a long time. In fact, the destination factors are not always as accurate because of uncertainties and lack of information. This theory assumes that perception depends on personal factors such as culture, awareness, and individual social networks, which may not always be 'rational' enough.

Theoretical Approach	Level of Analysis	Assumptions
Neoclassical (macro)	Country	Migration is explained as a result of labour market gaps between countries
Neoclassical economics (micro)	Individual	Individual rational actors decide to migrate because of a cost-benefit calculation.
New economics	Household	The household influences migration at the individual level as a collective action in economic survival
Dual Labour Market	Structural (Internal)	Structure demands of developed countries
World System Theory	Structural (International)	Market and cultural penetration from the core to peripherals.

Table 2.2: Summary of some migration theories with their assumptions relevant to this literature review.

Below is a review of fundamental theories relevant to describing Bangladesh's contemporary migration scenario.

2.2.1 Theories that explain international migration from Bangladesh

Only at the end of the former century did the demand for cheap labour go high, and people from developing countries migrated internationally either for the long term or permanently remained in the destination country. The members of these groups act in common to maximize their incomes, minimise their risks, and overcome limitations that occurred due to the failures of the national labour markets (Porumbescu, 2015). The new economics of labour migration theory emerged, which addressed some of the ideas and principles considered in creating the neoclassic theory. It explains migration by geographical differences in the supply and demand for labour. Many critics argue that labourers migrate from low-wage and labour-surplus regions to high-wage and labour-scarce regions. Many scholars have developed arguments drawing on this theory, arguing that the new economic theory of migration highlights not individuals but families, households, and many other units of production and consumption level

(Dannecker, 2013; Moniruzzaman and Walton-Roberts, 2018b). The increase in economic conditions through wage gain and remittances are also strong reasons for migration. Government policies in the field of economic changes, capital markets, and social security systems also represent significant factors in influencing the decision to emigrate. The main point here is that individual decisions are shaped by wider transforming structural, institutional and policy factors and processes. However, these policies can decrease the intensity of the migration process if the social and economic differences between the rich and the poor decrease.

The new economic theory of migration was built upon the experience of Mexican migrants in the USA (Massey and Espinosa, 1997; Taylor J. E., 1999; Asad and Garip, 2019). The characteristics of the US policy regarding migration could have encouraged or restricted this phenomenon, whether it is worth becoming a migrant in the USA. This is about the dynamics of labour markets in the host country too. A similar mechanism fuelled the Turkish migration flow to Germany after the end of the recruitment agreement. The theory, overall, is an avatar of the neoclassical approach in which rationality, methodological individualism, and lack of regard for structural trends and constraints built the core. The new economic theory of migration recognises the structural influences of changes in labour markets in both the host country and the source country. Hence, the theory is too one-sided to adequately capture the complexities of the issues under international migration analysis.

Nevertheless, the new economic theory of migration explains the current international migration in a specific context, where remittances lessen production and livelihood constraints faced by households in developing countries like Bangladesh. However, a much more integrated approach is essential to understanding and explaining Bangladesh's current international migration complexity.

Some scholars argue convincingly that international migration issues are better tackled by using an interdisciplinary approach and drawing on migration networks theory and migration system theory (Castles, 2008; Castles, Haas and Miller, 2014). Because once a critical number of migrants have settled at the destination country, migration becomes self-perpetuating. It creates a strong social network and economic structure to sustain

the process. Links to migrated family and friends in employing countries influence upcoming migrants' decision to choose their migration destinations.

Within the network theory, the role of the social capital of the migrants also helps explain why a larger number of migrants from Bangladesh are choosing Malaysia and Gulf countries as their migration destinations (Rahman, 2018; Masud, Hamzah and Ahmed, 2019). The networks between labour migrants in these countries and their society of origin shape choosing migration destinations for potential migrants. Initially, one or two individuals migrate from a village using support from government initiatives or familial relations. Then the migrant helps, even sponsors other members of his/her family (Shah and Menon, 1999). Migrants with pre-existing networks tend to stay close and create dynamics that influence the probability of migration destination among individuals in the origin society (Mannan, 2020).

The dual labour market theory is another theory that explains the contemporary international migration scenario in Bangladesh. In fact, to some extent, the dual labour market theory of migration was shaped by the colonial experience (Hofmeester and Zwart, 2019; Ashiagbor, 2021). The theory also explains migration as the result of a temporary pull factor, namely strong structural labour demand in Europe, the Americas and Asia's developed countries. International labour migration, mainly from Bangladesh to developed countries in the Middle East, Malaysia, and Singapore, increased based on their societies' demands (Mannan, 2020).

In developed countries, some jobs are always difficult to fill because they are dirty, dangerous, and demanding. Dual labour market theory argues that the economic structure is set as such that a permanent supply of low-skill, low-pay, and low-prestige labour is always in demand, creating an aspiration to migrate from developing countries like Bangladesh (Hagen-Zanker, 2008; Rahman, Bakshi and Kamruzzaman, 2020). It is characterised as secure and prospects for advancement. Others argue that jobless poor want to do non-standard jobs, but certain aspects of the weakly designed welfare system, such as eligibility criteria, payment methods, and duration, create a disincentive to work. Consequently, there is mounting evidence of a slowdown in social progress and

widening of deep structural inequalities across multiple dimensions of life (Bramley et al., 2021).

The capitalist expansion after the colonial period has changed the mode of production and the culture, with more robust transportation, communication, and military links penetrating the peripheries (Hopkins and Wallerstein, 2016). It has shaped the "capitalist world economy" as a "total social system" (Wallerstein Immanuel, 2006). This has led to the world-systems theory, which takes a historical structural approach, and the role of disruptions and dislocations in peripheral parts of a country (Zołędowski, 2020). Land consolidation, new capitalist manufacturing, and the emergence of large agro-business companies have created a socially uprooted population with a weakened attachment to their ancestral land and prone to migration. The process was more straightforward for the colonial powers with their former colonies. Because cultural, linguistic, investment, transportation, and communication links were established early. The world system theory differs from labour migration theory because it has little to do with wage differences between countries. This contemporary international migration from Bangladesh occurs due to the dynamics of the global economy and former ties. This can be seen in different ways and argued that even after decolonisation, former colonies' economic dependence remains on their mother countries (Lusis and Bauder, 2010; Bansal, Khatri and Sinha, 2018; Nwodo, 2021). These theories help understand linkages among migration, development, and globalisation in the contemporary world.

2.2.2 Rural to Urban Migration

The agglomeration of the urban way of life brings many people from the countryside to city areas in developing countries. Moving to the cities can enhance well-being, offer an escape from poverty, and provide access to better opportunities, employment, health, and education (Rahman et al., 2018; Alam and Mamun, 2022a). Insecure rural livelihoods, shocks that make subsistence difficult, and the desire for upward mobility make this rural-urban migration stream (Lyu et al., 2019). Rural planning has never received much attention compared to urban planning initiatives. The crisis and potential of agrarian society, particularly for small-scale subsistence farmers, fishers and informal sectors in rural settings, have not been studied enough to optimise its mode of

production, environment and settlements. Massive population growth in rural areas cannot always employ everybody in agriculture and traditional rural livelihoods. Therefore, a lack of livelihood opportunities pushes people to nearby cities for employment (Rahman et al., 2018).

The chance of a better job, better access to education and services, and a higher standard of living contribute to millions every year moving to nearby cities (Hildebrand, Kanaley and Roberts, 2013). Rural-to-urban migration contributes to housing, infrastructure, and services shortages and causes tensions with host communities. Many informal settlements, including slums or shanty towns, are the initial destinations for these migrants from rural areas. Cities get marked by inequality, poverty, conflict, violence, and environmental degradation. However, the reasons for rural-to-urban migration are not always the same. Rural-to-urban migration can also be a mode of adaptation to stressful environments. An increase in flooding and river and coastal erosion leave rural people with no choice but to migrate to urban areas (Rahman et al., 2018; Biswas, Kabir and Khan, 2019; Ayeb-Karlsson, Kniveton and Cannon, 2020).

This seasonal outmigration is contributing to poverty in the urban settlement. An estimated third of the global urban population lives in informal settlements, and this figure is expected to double by 2030 (UN-Habitat, 2009). For example, the urban population of Bangladesh has exploded with the shift from an agro-centred rural economy to an industry-based urban economy (Biswas, Kabir and Khan, 2019). The growing working opportunities in Dhaka, Chittagong, and their suburbs are expanding by the day due to the boom of export-oriented garment factories. The Dhaka metropolitan area accounts for 10 per cent of Bangladesh’s population and 36 per cent of the gross domestic product (GDP). The Chittagong metropolitan area, home to 3 per cent of the population, contributes another 11 per cent of the GDP (Muzzini and Aparicio, 2013). Most of these workers, including their families, are recent migrants from rural areas of the country. These massive urban migrants have contributed to delaying early marriage and childbirth and, most crucially, revolutionised women's empowerment. On the other hand, the mega city's population density has reached over

44 thousand per square kilometre and has become one of the worst cities (Hassan et al., 2021).

2.3 Human-place relationships in the time of changing climate

Human modification of the Earth's systems is accelerating anthropogenic, human-induced climate change. Human action has shifted biogeochemical and water flows, modified land cover, increased erosion, homogenized biota, and introduced new chemical compounds into the atmosphere. For many scholars, this represents a shift into a new geological epoch of the Anthropocene (Rockström Johan et al., 2009; Steffen et al., 2018; Lade et al., 2020). Human exploitation of the world's ecosystems is reducing the ability of ecosystems to continue to function and, therefore, limiting human adaptability to the stressed environment (Hayward et al., 2019). Based on an existing assessment of climate change's contribution to global catastrophic risk, a research centre at the Centre for the Study of Existential Risk (CSER) has developed a scheme that classifies GCRs into three key components: "(i) a critical system (or systems) whose safety boundaries are breached by a potential threat, (ii) the mechanism by which this threat might spread globally and affect the majority of the human population, and (iii) the manner in which we might fail to prevent or mitigate both (i) and (ii) (Avin et al., 2018; Beard et al., 2021).

Environmental stressors can result in diverse forms of human migration. The key findings are that migration responses to environmental drivers are highly context-specific (IOM, 2014a). The complexity of environmental migration begins with the process of setting concrete, agreed-upon definitions. However, defining and subsequently measuring the process of environmental migration is not uniform throughout the literature (Dun and Gemenne, 2008). Attempts are ongoing to quantify the human threshold of environmental stress and contribute to debates on migration and non-migration decision-making (Adams and Kay, 2019a). From the above literature review, migration theories draw on material, relational and psychological aspects along with individual and household characteristics. These theories highlight intervening factors, such as social networks, which significantly influence migration and (non-

migration) outcomes. However, in the context of environmentally induced migration, there are five characteristics which have been identified in this literature review:

a) ***Environmental migration is internal*:** Empirical studies and meta-analysis show that environmentally induced migration is hardly ever international (Tabucanon, 2014; Koubi et al., 2016; Hoffmann et al., 2020). Most people migrate to nearby villages or cities and seek protection from the regional and national levels. It means that, at least initially, environmental migration is more often a regional and national issue and hence Coordination of Humanitarian Affairs (UNOCHA) defines this phenomenon as Internally displaced people (IDPs), people who are forcefully displaced due to conflict, violence, violations of human rights, or natural or human-made disasters (Didenko et al., 2021).
b) ***Environmental migration is disaster-specific*:** Sudden and slow-onset disasters both cause migration, but their nature seems different. Sudden onset disasters, i.e., coastal erosion, cause migration (O'Connor, Bruch and Maekawa, 2019). If the sea claims the coast, the land does not exist anymore. In this case, migration is entirely forced and permanent and can be called a displaced population. On the other hand, slow-onset disasters, i.e., floods, damage farmlands and homes. Affected people flee but return as water recedes, which is called temporary or circular migration (Joarder and Miller, 2013; Das Sharma, Bracken and Balz, 2020). Migration for people affected by multiple disasters also tends to follow similar patterns but worse.
c) ***Environmental migration is not always forced*:** Environmental migration is not always wholly forced (UNHCR, 2020). This force's nature manifests through livelihood challenges (Stojanov et al., 2016; Ionesco, Mokhnacheva and Gemenne, 2017). The challenge has a threshold, and as it increases, people initiate alternative livelihoods, followed by migration (Bardsley and Hugo, 2010; Dow, Berkhout and Preston, 2013; Call and Gray, 2020).
d) ***Isolating environmentally induced factors is a wicked problem*:** Climate change poses not only technological, economic, and political problems but also has moral and, indeed, critical challenges-as is widely maintained-then such moral connotations cannot be avoided (Conradie, 2020; Wohlgezogen et al., 2020). The

challenge can not be addressed by climate and/or social engineering. Rather, the process of building adaptive capacity in an increasingly at-risk area through alternative livelihoods and individual migration to bring remittance and enhance adaptive capacity is quite complex to distinguish which factors and how they are creating the forces to migrate. Not just the environmental factors that influence migration, the concept of environmental migration, in general, has been argued as a "southern problem" and "a bias toward these countries" (Piguet, Kaenzig and Guélat, 2018). Public discourses are also at stake in the wicked choice we make about how to treat displaced people (Geuijen et al., 2017). Discourse is important in defining problems and solutions. How the 'problem' of climate-induced displacement is framed also influences how policy responses are shaped. This area of research needs to be explored to make environmental migration more manageable.

e) ***Safe, orderly, and managed retreat is a complex issue*:** Many climate-induced human mobility management solutions are available to respond to environmental stress challenges (Marter-Kenyon, 2020). However, most of these are international in the form of humanitarian visas, temporary protection, authorization to stay, and regional and bilateral free movement agreements, among several others (Schwerdtle et al., 2020). There are hardly any authorities and organisations equipped to offer accommodations, training, livelihoods and well-being for these large groups of displaced people, predominantly due to environmental factors (Ajibade, Sullivan and Haeffner, 2020; Hanna, White and Glavovic, 2021).

2.3.1 Migratory behaviour under increasing environmental stress

"Environmental migration" is seen as an outcome of stressful environmental factors and a drastic consequence of economic, social, and cultural factors, which have direct and indirect connections with the impacts of extreme weather events. For example, according to Gidden's structuration theory (Giddens, 1985), there is a constant and reciprocal interaction between agents and agencies (human and nature). These interactions form utilities and, therefore, attachments to a place. If these rules and

resources do not improve over time and space, then the utility of that place becomes less attractive.

Despite the fact that early evidence of environmentally displaced populations in many city-slums scientists has made the informed prediction on numbers and the process of climate-induced displaced populations in coming decades (Ahsan, Kellett and Karuppannan, 2016). In the same body of literature, evidence is also available that affected people want to stay in their homes. However, in the context of increasing exposure and sensitivity, there is a recognition that adaptive capacity at an individual or group scale is shaped by a combination of factors, particularly the policy environment both in the source location and the destination of migration. Managing retreat through regular channels without abandoning everything behind is a crucial challenge.

Environmental migration has been studied from many levels and dimensions using various methodologies. However, the fundamental problem of studying migratory behaviour in an environmentally stressful condition is that vulnerability is interlinked with exposure, sensitivity, and adaptive capacity, which are differentiated between people within households and communities and are shaped by material, relational and psychological dimensions. Significant attempts have been made to study this kind of migratory behaviour through the lens of livelihood vulnerability (Hahn, Riederer and Foster, 2008; Toufique and Islam, 2014; Amoatey and Sulaiman, 2018). Studies have also been done using single and multiple stressors, i.e., how the impacts of a sudden-onset event influenced mobility at a particular time (Acharya, Chakraborty and K, 2018). Most of this existing body of migration literature focuses on why, how, and when an agent migrates. However, a few focus on how slow-onset events, i.e., salinity and sea-level rise, create unique conditions in a particular place and how those who remain in a similar condition consider non-migratory decisions. These slow-onset climate-induced pressures are particularly significant as they characterise climate change in the coming decades.

Place utility theory is usually used to refer to the relationship between the location of a resource and its attractiveness to its agents. The theory has been applied in explaining migration behaviour (Baker, 1982; Williams et al., 2016; Bakewell, 2010; Adams,

2016; Adams and Neil Adger, 2013a). According to utility theory, migration can be seen as a process of improving conditions, which can be studied in terms of placing utility evaluations by individuals (Wolfel, 2005). Wolpert describes this "utility evaluation" concerning population composition and characteristics, which evolve differently over time (Wolpert, 1965b). Place utility has been criticised, and it has been argued that affected people may decide not to migrate due to high satisfaction, resource barriers, and low mobility potential. It has been suggested (Adams, 2016) that caution should be applied when presenting empirical data that "immobility in dissatisfied people is more likely to be caused by attachment to place than resource constraints."

In another example, Mistri and Das (2018) conducted a study in the Sundarban area of West Bengal, India, and found that 67% of the 400 participants found themselves at high risk and were concerned about their families and the local community but were not migrating. The findings also align with other earlier work by Leiserowitz (2006). It is argued that risk perceptions are multidimensional, and "public perceptions are influenced not only by scientific and technical descriptions of danger but also by various psychological and social factors, including personal experience, affect and emotion, imagery, trust, values, and worldviews."

These "personal experiences" are closely related to "risk perceptions," which manifest uncertainties around the sustainability of people's livelihoods. For example, if some households in a rural village have experienced flooding which damaged their farm, crops and/or house, it is highly likely that this will have brought uncertainty to their food security for the year ahead, as well as challenged their safe living conditions (Toufique and Islam, 2014). Food security is just one dimension of the experience of flooding, but hazards like floods create multidimensional impacts on those households. It is highly likely that a hazard damages a household financially and puts material, physical, and intangible assets in danger (Foudi, Oses-Eraso and Galarraga, 2017).

Similarly, a household living in the saline zone struggles with tidal surges, cyclones, and increasing salinity. The drought and saline zones are highly vulnerable to freshwater shortages. Water in these zones is not only scarce but is also "unsafe" for drinking. The saline zone also suffers from salinity in the water used for irrigation, which has already

affected the land's productivity. These factors create multidimensional uncertainty regarding accessing safe sanitation, safe drinking water, food security, health, and infrastructure. How do attitudes towards utilities and attachments to a place function in an "unsafe and uncertain" condition like this?

Studies have revealed that many factors play decisive roles in the scale of utilities and attachment to a place (Adams and Neil Adger, 2013b). Equity position, meaning the access to a household's assets, influences the ability to take chances and select alternative livelihoods that minimise risks. People who are located in unsafe-uncertain conditions are affected by other factors, such as the amount of available working capital, farm scale, opportunities for efficient diversification of shifting, the time preference in consumption, memories of past disasters, religious beliefs, and many others. Scholars argue that the severity of impacts is influenced by adaptive capacity, including access to meaningful information such as early warning systems and exposure, sensitivity, and adaptive capacity affect the relationship with the place (Kamal et al., 2018; Ahsan et al., 2020).

The Intergovernmental Panel on Climate Change (IPCC) (Schneider et al., 2007), the United Nations Development Programme (UNDP) (2007) and Hahn (2008) have developed vulnerability indicators that cover exposure, adaptive capacity, and sensitivity. In an "unsafe and uncertain" condition, there is no doubt that the factors that shape vulnerability increase if exposure is increased. It is also clear that vulnerabilities decrease if adaptive capacities are increased. In an unsafe and uncertain condition like this, where activity depends on climate-regulated resources, relationships to a place are heavily influenced by hazards' frequency and magnitude (exposure). However, what is complex to measure is to what extent natural hazards contribute to livelihood vulnerabilities that trigger the utilities and attachment of a place. The models and information available on climate variability, livelihood vulnerability, and place are primarily at the global, national, and continental levels.

Murniati et al. (2017) used these criteria and compared livelihood vulnerabilities in two Indonesian rice-farming villages. The authors found that organic farmers who had less access to alternative income or farming were more exposed to livelihood vulnerabilities.

These organic farming vulnerabilities mean that the external stress factors are slightly more severe for the same variability of extreme weather events for organic farmers. People who experience the same event might not be impacted to the same extent or in the same ways. For example, organic farmers are more exposed to rainfall patterns. Organic paddy farming becomes more challenging and reduces productivity if the rain comes late or less during the farming season.

In contrast, non-organic paddy farmers can use more climate-tolerant paddies, which are less exposed to natural rain variability than organic paddies. Exposure refers to how late, early, or sizeable the rainfall is, not to what extent the farming is affected. Their material assets and farming practice influence their adaptive capacity. For another example, Adu et al. (2018) conducted a comparative study among 150 households in two municipalities of Ghana to assess and measure 31 local livelihood vulnerabilities and how they affect households. Adu et al. (ibid) have revealed that the water-human relationship is the most sensitive component, followed by socio-demographic profile, food, social networks, livelihood strategies, exposure to hazards, and health. Sensitivity is determined by the degree to which a system is modified or affected by an internal or external disturbance or set of disturbances (Gallopín, 2006). For an example of sensitivity in this context, the extent to which drinking and farming are affected by late or lower rainfall (not how late or how lower) can be reviewed. Exposure and sensitivity are linked but are never the same. However, none of these two studies above explored the underlying causes or context of these vulnerabilities or how they are linked to a place's relationships.

There are a variety of frameworks that can be used to understand household adaptability. Adaptive capacity involves a combination of factors determining the degree to which hazards put someone's life and livelihood at risk. A household's capacity to adapt is described by its capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard (Bevacqua, Yu and Zhang, 2018; May, 2019) – capacities that are themselves shaped by a combination of material, relational and psychological dimensions. Adaptive capacity is also linked to sensitivity (not vulnerability. Both act as the other side of a coin) and the frequency and magnitude of

these hazards (exposure). The complex interdependence of these exposure and sensitivity factors with all of the livelihood components makes the utility assessment process of that place (the impacts and responses, including policy strategy) "complex" (Amusan and Olutola, 2015). A holistic understanding of these factors and their relationships with the utilities and Attachment of a place is crucial to building targeted policies.

2.3.2 Livelihood resilience, vulnerability, and adaptive capacity

This study takes a clear epistemological stand using different terms to explore the research question. It uses definitions from credible organizations in the field of climate change and migration, such as the IPCC and the International Office of Migration (IOM). For example, from the IPCC's glossary, the term resilience generally means the capacity of social, economic and environmental systems to cope and transform in the context of human-environmental systems (IPCC, 2018a). Livelihood resilience is a very important concept, even though the term resilience has many different meanings in the context of recovery and reorganisation after deep transformations (Tanner et al., 2014; Zhou et al., 2021). Simply, livelihood resilience refers to the ability of livelihoods to recover from shocks and, when recovery is no longer possible, to transform into a new livelihood. Under increasing environmental stress, recovering after repeated shocks and intensified loss and damage is challenging. In this context, the tools and processes that help recover today will not necessarily be applicable to tomorrow's shocks.

Some literature applies concepts of absorptive, adaptive and transformative capacity as representing different degrees of resilience (Béné et al., 2014). However, these distinctions are problematic and not easily differentiated in the case of migration and non-migration when decisions are multi-faceted and driven by a complex interplay of many drivers.

Even though studies have revealed that factors of equitable resilience, where subjectivity, inclusion, scale and transformation play decisive roles in the scale of resilience mechanism (Matin, Forrester and Ensor, 2018), in contrast, adaptative capacity recognises this temporal nature of the adaptation mechanism. Realistically, households transform using the opportunities to enhance adaptive capacity instead of

bouncing back. Some scholars argue that adaptive capacity is more comprehensive than the concept of resilience, and this research focuses on adaptive capacity and people's own perceptions and motivation for action (Gallopín, 2006).

This study uses the lens of vulnerability, a context that characterises rural livelihoods as a function of exposure, sensitivity and adaptive capacity (Adger, 2006) rather than resilience to explore the process of migration and non-migration decisions. Because, the theory of vulnerability encompasses exposure and is a highly potential concept to drive more environmental, ecological, infrastructural and social theories in the time of mitigation and adaptation to changing climate(Byers et al., 2018).

The linkage between human mobility and environmental stress is highly problematic because human mobility may or may not have direct causal links with environmental stress. Instead, it is critical in most situations; people choose or are forced to migrate due to a complex number of factors where environmental stress can be the primary or one of many secondary factors that drive an individual, a household, or a group of people to migrate.

Paramount importance to this aspect of literature is the notion of vulnerability and resilience. Drawing on Adger's (2006) studies identify three dimensions to the vulnerability nexus: a) *exposure* to the impacts of disasters- some places are more or less exposed to a particular set of disasters compared to other places due to their geographical location; b) *sensitivity* to the impacts of disasters- to what degree some communities are sensitive to a particular set of disasters; and c) the *adaptive capacity* of the affected people- their ability to adjust with the exposure and minimise sensitivity to that set of disasters using assets, networks, and skills. All these components determine how vulnerable a place or people is and how much the households living there can transform themselves by enhancing their adaptive capacity (Gallopín, 2006).

It is essential to understand pre-existing vulnerabilities and how they influence climate change-related stress, shocks, and crises through losses and damages. Livelihood vulnerability assessment is crucial for anchoring affected people's migratory and non-migratory decisions. Their migratory and non-migratory decisions are the primary outcome of why they are to live or leave elsewhere with less environmental risks and

better livelihood opportunities. Vulnerability assessment methods have been developed over several decades in disaster management, food security, poverty analysis, sustainable livelihoods, and related fields (Downing et al., 2002; Adu et al., 2018). Vulnerability is people, place, and livelihood, specifically addressing who is vulnerable, to what and where. The next step is to explore qualitatively and quantitatively what shapes exposure to environmental risks. At what scales are their wealth, assets, gender, age and ethnicity vulnerable? All these mean vulnerabilities vary across places. People in the exact location might not be similarly vulnerable to the same environmental stress, shocks and crises. Even in the same location with the same exposure, different social groups (household, community) are sensitive differently, meaning vulnerabilities are not felt evenly. Therefore, the techniques for framing the structure of vulnerability indicators need to be flexible, regional, hazard-profile-specific, livelihood-centred and qualitatively defined (Dressler and Guieb, 2015; Panthi et al., 2016; Peras, Pulhin and Inoue, 2017).

Among many, Shah with his colleagues assessed the livelihood vulnerability index (LVI) for agricultural and natural resource-dependent communities in Trinidad and Tobago and found that despite different characteristics of social and geographic location, LVI can be broadly applied in comparable settings in small islands and developing states, and other developing countries (Shah et al., 2013).

Mapping vulnerability is a key to assessing adaptive capacity, including human-place relationships under increasing environmental stress. Households are likely to migrate only when they have aspirations and capabilities to do so. Aspirations and abilities in this context are deeply rooted in the limits of adaptive capacity. Assessing and conceptualising the limit to adaptive capacity in increasing and navigating how relationships with place change over time remains a very little explored area (Brooks et al., 2019; Datta and Behera, 2022). In the vulnerability and place relation nexus, identifying how the individual responds and how adaptive capacity reaches its limits at which people will decide to migrate (or not) is essential in the time of changing climate.

Because, under increasing environmental stress, in-situ adaptation is often possible only up to a certain point, after which it fails, and migration becomes the only option (Barnett

and O'Neill, 2010; McLeman, 2011). These thresholds of in-situ adaptation are not just dependent on *physical* conditions (i.e., land and land-use change, crops and biodiversity loss), but also *economic* (i.e., cost of building infrastructure, capital to diversify livelihoods), *technological* (i.e., innovative engineering and technological solutions), and *social* (i.e., networks for successful livelihood outcomes) conditions of the place that determine the tipping points for the affected households. Adaptation limits are also determined by society's values, perceptions, processes, and power structures (Adger et al., 2009a; Dow et al., 2013a). The related links among these make adaptation practices challenging to examine and identify hidden limits. For example, with minimal livelihood options and skills, poor education, and inadequate assets and networks, the adaptation limits of a household in rural areas of Bangladesh are different from other households in rural areas of a developed country.

2.3.3 Environmental migration as an Adaptive process

Migration may be one the most effective ways not just to allow people to diversify their income but to escape environmental risks. Intergovernmental Panel on Climate Change (IPCC) defines adaptation as *"In human systems, the process of adjustment to actual or expected climate and its effects to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate and its effects."* (IPCC, 2018b). Increasingly, attention is being devoted to the human-environment-place nexus, and policies are being designed for climate change adaptation that includes migration as a component (Jha and Gupta, 2018). Most scholars argue that climate-induced migration is a form of adaptation – reducing vulnerability through migration is negative freedom. Negative freedom affects a household's aspirations and capabilities in making migratory and non-migratory decisions (Solano, Wali and Yar, 2020). However, this section reviews adaptation and maladaptation literature and their links with migratory behaviour.

However, this capacity to adjust to environmental stress has limits. The point at which affected people's objectives cannot be secured from intolerable risks through adaptive actions is usually framed as 'adaptation limits.' Adjustment to these environmental

stress can take place in the place where affected people are. This capacity to stay in situ and adjust to the impacts of stress occurs by addressing structural and non-structural vulnerabilities, including livelihood diversification. However, these capacities are limited to time and place, and adaptation being situ may not remain viable or even possible in perpetuity. Migration is seen as one form of behavioural adaptation option to this stress. Migration in this context depends on the ability of systems, institutions, affected people, and other organisations. Practically, migration, in this case, is the interplay of what individuals and households can do and how this is shaped by wider social, institutional and economic factors. These factors help the affected groups take advantage of opportunities that build a successful migration pathway.

In this context, migration can be studied as a process. In a process in which exposure to disasters increases, in-situ adaptation mechanisms do not work (maladaptation); hence the households become so sensitive to the disasters, and at a point, adaptive capacity reaches its limits in staying in situ, and members are forced to migrate (Eriksen et al., 2021). Well-intended adaptation aid can make households more, rather than less, vulnerable to disasters if the adaptation metrics fail to empower the household or are inflexible to building long-term adaptive capacity (Berrang-Ford et al., 2017; Dilling et al., 2019). Studies in this vulnerability-maladaptation nexus also investigate migratory behaviour, especially their ability to migrate in the face of increasing exposure and sensitivity. However, studies have confirmed that only a few people migrate in these conditions (Mallick and Schanze, 2020), and most people carry on until the place itself is reclaimed by the rivers or seas (Oakes et al., 2017). Emerging evidence is available at this point that displaces people who do not migrate internationally. They are more prone to resettle in nearby villages or cities where uncertainties associated with livelihood opportunities and social networks are minimal (Haas, Castles and Miller, 2019; Piggott-McKellar et al., 2019).

Despite the economic, physical and psychological loss and damage due to living in vulnerable and uncertain conditions, thoughts of migrating to an environmentally safer place are usually absent (Hayward and Ayeb-Karlsson, 2021). Scholars argue that attitudes towards risk and uncertainty are not readily observable. Research by

geographers, social psychologists and others has revealed that as the risks from hazards are event, place, and time-specific, responses are also regional and culture-specific (Lee et al., 2015a; Osberghaus et al., 2013). One of these adaptive responses is leaving home or being relocated to a safer place (IOM, 2014b; Massey et al., 1999; De Haas, 2014). However, this is the last option when the condition is "stay and die or move"- the moment cyclone or erosion wash away their homes.

Initially, exposure and sensitivity to prolonged environmental stress cause economic, social and political conditions which diminish adaptive capacity. Increasing risks of disasters make the sustainability of people's livelihoods more challenging to achieve, and the journey of everyday life becomes more uncertain (Heslin et al., 2019). Eventually, conditions become so severe that the utility of that place disappears, and the affected people have to leave. For example, in the case of a gradual onset disaster such as salinity intrusion (Rakib et al., 2019; Tran, Nguyen and Vo, 2019) or rising sea levels (Mehvar et al., 2019; Leal Filho et al., 2018), farmland might see its crop production threatened (Dasgupta et al., 2015; Tran, Nguyen and Vo, 2019).

Similarly, severe flooding can damage homes, businesses, schools, crops and seeds and cause interruption to many other goods and emergency services, which could make livelihoods as well as life itself "unsafe" (Toufique and Islam, 2014; Preston, Dow and Berkhout, 2013; Nelson, 2013); (Aniah, Kaunza-Nu-Dem and Ayembilla, 2019). Everyday life is full of uncertainties within such unsafe conditions. For example, uncertainties over successful farming (Bornemann et al., 2019), access to freshwater (Huot et al., 2019), household livestock and access to alternative income during and after disasters make livelihoods and well-being not just unsustainable but miserable. Despite these "unsafe-uncertain" livelihood conditions, migration is not a usual option for many affected people (Adams and Kay, 2019b; Ahsan and Warner, 2014). For them, lives continue within an "unsafe-uncertain" condition with many "uncertainties" (Heslin et al., 2019; Oakes et al., 2017; Head, Klocker and Aguirre-Bielschowsky, 2019). The impacts of both slow and fast onset climate change deteriorate livelihood severely. These vulnerabilities make the sustainability of the adaptation strategies more challenging to achieve, and the journey of everyday life becomes full of uncertainties.

In these unsafe-uncertain conditions, households are unable to eradicate poverty by just diversifying livelihoods. However, the adaptive efforts, for example, whether to leave "home" where livelihood is "unsafe and uncertain" and migrate elsewhere with the hope of a bit more "safe and certain" become a highly complex decision-making process. Even in similar circumstances, households take non-migratory decisions because these households are not fully informed about their risks (Jahan, Mamun-ur-Rashid and Wahab, 2015).

2.3.4 Migration to enhance adaptive capacity

There is a difference between individual migration in enhancing adaptive capacity to climate change from the 'hot spots' and household or community-level migration responding to the collapse of an adaptation mechanism (Entzinger and Scholten, 2022). Individual and household vulnerability to disasters is not always the sole determinant of migration. Individuals (s) from rural at-risk households of developing countries like Bangladesh migrate, to some extent, voluntarily within and beyond borders for better income. Monitory and non-monitory, i.e., social and cultural remittances in the form of skills and knowledge, are a potentially significant source for enhancing adaptive capacity back home. Migration in this context may or may not have a direct link with disasters. It is seen as an effective way for households to diversify income and enhance adaptive capacity in increasing stressful environmental conditions (Pemberton et al., 2021; Hoque, Haque and Islam, 2022). To ensure livelihood, affected people find alternative sources. Evidence from developing countries shows that one or two member(s) from a household migrate (usually temporary or circular) and send remittances back to their origin. These remittances are usually used to sustain the household's livelihoods, enhancing the remaining members' adaptive capabilities. To these people, the migration of one or two household members is not a direct response to climate change impacts. Instead, it is a process of ensuring, even enhancing, adaptive capacity or sustaining their livelihoods, which have become more vulnerable to climate change (Banerjee et al., 2019).

Whereas environmental migration is often understood as non-voluntary when livelihood becomes unsustainable and migratory or non-migratory decision-making

becomes harder. The permanent migration of an entire household is usually seen as a failure of in-situ adaption and the last option (Jamero et al., 2019). Unless it is such a planned relocation, not everybody or entire households from an environmentally affected "unsafe uncertain" condition migrate voluntarily at the same time.

2.4 Relevant theories on non-migration in the natural environment

Place attachments (Junot, Paquet and Fenouillet, 2017), place identity (Peng, Strijker and Wu, 2020), place dependency (Marshall et al., 2017), place utilities (David and Phillips, 2015), and sense of place (Raymond, Kyttä and Stedman, 2017), have been variously used to explore human-place relationships in *natural* environmental conditions, the environmental conditions that do to experience significant change (Low and Altman, 1992). The theories have also been used to explore human-place relationships in *stressful* environmental conditions. This study only reviews how these theories have been used to explore human-place relationships in stressful environmental conditions. Disagreement in the literature related to how vulnerabilities should be defined and measured and how these vulnerabilities are linked with the place and the households at risk (Fischer and Chhatre, 2015), place utilities, and sense of place (Jennifer D. Adams, 2013; Mulvaney, Merrill and Mazzotta, 2016), place attachments (Williams and Vaske, 2003; Adie, 2020) explore the psychological and social dimensions of a place with the people and the interplay between these variables. Among these three dimensions, scholars have argued which one is best to assess human-place relationships in a stressful environment, specifically human links to engage with the environment (Nicolosi and Corbett, 2018). Nicolosi and Corbett (2018) identify gaps in current research and suggest further research to “move away from unidimensional conceptualisations of place and “embrace a more holistic and inclusive” approach. The authors also suggest “much work remains to be done in regards to the intersections between relations to place and climate change mitigation efforts, environmental degradation, climate impacts, and adaptive capacity”.

Initially, environmental stress causes economic, social, and political conditions, which reduce adaptive capacity. Increasing risks of disasters make the sustainability of

people's livelihoods more challenging to achieve, and the journey of everyday life becomes more uncertain (Heslin et al., 2019). Eventually, conditions become so severe that the utility of that place disappears, and the affected people have to leave. For example, in the case of a slow-onset disaster such as salinity intrusion (Rakib et al., 2019; Tran, Nguyen and Vo, 2019) or rising sea levels (Mehvar et al., 2019; Leal Filho et al., 2018), farmland might see its crop production threatened (Dasgupta et al., 2015; Tran, Nguyen and Vo, 2019). Similarly, severe flooding can damage homes, businesses, schools, crops, and seeds and cause interruption to many other goods and emergency services, which could make livelihoods as well as life itself "unsafe" (Toufique and Islam, 2014; Preston, Dow and Berkhout, 2013; Nelson, 2013); (Aniah, Kaunza-Nu-Dem and Ayembilla, 2019). Everyday life is full of uncertainties within such unsafe conditions. For example, uncertainties over access to crucial livelihood assets and the ability to achieve livelihood outcomes (Bornemann et al., 2019), access to freshwater (Huot et al., 2019), household livestock, and access to alternative income during and after disasters make livelihood not just unsustainable but unendurable. Despite all of these "unsafe-uncertain" livelihood conditions, migration is not a usual option for many affected people (Adams and Kay, 2019b; Ahsan and Warner, 2014). For them, lives continue within an "unsafe-uncertain" condition with many "uncertainties" (Heslin et al., 2019; Oakes et al., 2017; Head, Klocker and Aguirre-Bielschowsky, 2019).

Most of the people who stay use many ways to minimise the challenges and build some form of resilience, the ability to withstand and recover from shocks (Jamero et al., 2019; Parsons, 2019). This might be because the livelihoods of humans and their surrounding environment are deeply connected (Abid et al., 2016; Hess, Malilay and Parkinson, 2008). Depending on their assets, structures and relations, some people suffer severely (usually the poorest) and decide to migrate. Researchers from most disciplines have studied migration, its causes, and the consequences for those who have migrated. Few studies have been done on the other group who remain and live in those conditions compared to this. Some scholars frame the challenge as people being "trapped" and unable to migrate (Ayeb-Karlsson, Smith and Kniveton, 2018; Logan, Issar and Xu, 2016). However, most people simply do not migrate for many reasons. For example, Adams (2016) found three reasons for non-migration in the highlands of Peru. In this

case, the reasons were high levels of residential satisfaction with respect to that place, resource barriers and low mobility potential. Despite negative health and livelihood impacts from climate-related phenomena, people carried on living in the highlands of Peru. This means that, in the same scenario, different individuals, households, and communities have different and multidimensional responses to ensuring the sustainability of their livelihoods (Acharya, Chakraborty and K, 2018; Mistri and Das, 2018; Cannon and Müller-Mahn, 2010; Black et al., 2011). It is not simply that all households who live in a similarly unsafe environment are impacted to the same extent or have the same ability to migrate. This means that environmental factors do not simply determine migration decisions.

In these stressful conditions, human-place relationships function in a complex manner, yet none of these theories accommodates how voluntary and forced relationships with the place work simultaneously. For example, place utility has been criticised, and it has been argued that affected people may decide not to migrate due to the high level of residential satisfaction with respect to that place, resource barriers, and low mobility potential. Adams (2016, p 429) suggests that caution should be applied when presenting empirical data that "immobility in dissatisfied people is more likely to be caused by attachment to place than resource constraints."

In another example, Mistri and Das (2018) conducted a study in the Sundarban area of West Bengal, India, and found that 67% of the 400 participants found themselves at high risk and were concerned about their families and the local community. The findings also fall in line with other work carried out earlier by Leiserowitz (2006), in which it is argued that risk perceptions are multidimensional and "public perceptions are influenced not only by scientific and technical descriptions of danger but also by a variety of psychological and social factors, including personal experience, affect and emotion, imagery, trust, values, and worldviews".

These "personal experiences" are closely related to "risk perceptions," which manifest uncertainties around the sustainability of people's livelihoods. For example, if some households in a rural village have experienced flooding which damaged their farm, crops and/ or house, these damages in livelihoods will likely have brought uncertainty

to their food security for the year ahead, as well as challenged their safe living conditions (Toufique and Islam, 2014). Food security is just one dimension of the experience of flooding, but hazards like this have multidimensional losses and damages to those households. It is highly likely that a hazard damages a household financially, physically, and socially and puts natural and human capital in danger.

Similarly, a household living in the saline zone in Bangladesh struggles with tidal surges, cyclones, and increasing salinity. The drought and saline zones are highly vulnerable to freshwater shortages. Water scarcity in these zones is both a matter of availability and quality, with potable water becoming “unsafe” for drinking. The saline zone also suffers from salinity in the water used for irrigation, which has already affected the land's productivity. These factors create multidimensional uncertainty regarding accessing safe sanitation, safe drinking water, food security, health, and infrastructure. How do attitudes towards utilities and attachments to a place function in an “unsafe and uncertain” condition like this?

A household's equity position influences the ability to take chances and select alternative livelihoods that minimise risks. People who are located in unsafe-uncertain conditions are affected by other factors, such as the amount of available working capital, farm scale, opportunities for efficient diversification of shifting, the time preference in consumption, memories of past disasters, religious beliefs, and many others. Access to adaptive information and early warnings and forecasts influence the extent to which people can adapt to shocks and crises (Adger et al., 2009b).

Along with the others, psychological attachments to places are intrinsic to human conditions. The human-place relationship has been studied by geographers using place attachment, place identities, and sense of place to explore people's emotional connection to place and how those connections shape thoughts and behaviours (Diener and Hagen, 2020). Geographers use many determinant attributes (i.e., age, social status, physical features, time spent) and explore the nature of the relationship with the place. However, none of these concepts accommodates both voluntary and forced factors that aspire to move or stay of individuals, households, or groups of people in a place. In this context,

this study explores place relations, a more neutral term of its nature, and seems more appropriate to fill this gap.

2.5 Non-migration under increasing environmental stress

Climate change and other environmental stressors are decisive push factors for migration and displacement – generating a growing threat to social welfare and regional economic and political security. However, there is an emergent research agenda exploring *non-migration*– considering, in this case, the factors that lead people to stay put under potentially harmful environmental conditions (Zickgraf, 2019; Ayeb-Karlsson, Smith and Kniveton, 2018; Mallick and Schanze, 2020) even when extant environmental risks deeply threaten livelihoods and welfare. There is an established literature on non-migration concerning geographically-bounded and place-specific hazards such as volcanoes (Kelman and Mather, 2008), earthquakes (Jackson and Conway, 2006), bushfires (Paton, Bürgelt and Prior, 2008), or risks from nuclear power stations (Venables et al., 2012); and a growth in interest in non-point source pollution-related and environmental risks from climate change, biodiversity loss and disruption to ecosystem services (Vaske and Kobrin, 2001; Adams and Neil Adger, 2013a; Bonaiuto et al., 2016a; Adams, 2016; Adie, 2020). However, growing research and policy interest is the interaction between multiple hazards that create unique livelihood conditions and resultant behavioural responses. There remain a series of questions about what drives an individual or household's choice to carry on living in a place where the increasingly stressful environmental conditions lead to diminished well-being and safety over time (Adams, 2016; Logan, Issar and Xu, 2016; Ayeb-Karlsson, Smith and Kniveton, 2018).

It is difficult to identify the exact reasons why and when an individual, household, or group of people from a community or even an entire region decide or are forced to migrate. For example, floods or drought may or may not be a direct influence, the only cause for changing the human-place relationships. It may well be the combined and inter-connected influence of a number of variables from poverty, political systems, better opportunities, or a mixture of these and beyond. However, it is also clear that the

impacts of environmental stress can be the underlying causes that directly and indirectly influence human-place relationships. The simple reason is that vulnerabilities of livelihood assets (financial, natural, social, human, and physical) are deeply related to the loss and damages incurred as a result of increasing environmental stress.

In these vulnerable conditions, increasing environmental stress adversely affects people, wealth, and landscape predispositions. Variable conditions act as the determining factors in the decision to migrate. For example, the ways in which environmental stress is felt by different people/individuals are mediated by a range of social, economic and political variables. Critical analysis of disasters, shocks, and crisis explores vulnerability and argues it is shaped by assets, capabilities and entitlements (Friend and Hutanuwatr, 2021). Salinity intrusion in the farmland due to sea-level rise threatens crop production. Flood damages crops, seeds, and access to goods and services that ensure a successful livelihood outcome. Crop failures make livelihood uncertain. Crop failure and severe flooding make homes inhabitable. Businesses, schools, and other social establishments remain closed for days and months, and this repeats year after year, making livelihood unsafe. These vulnerabilities contribute to migratory decisions and are a way of explaining the reasons why someone lives somewhere, as mentioned above.

For another example, Adu et al. (2018) conducted a comparative study among 150 households in two municipalities in Brong-Ahafo of Ghana to assess and measure 31 local livelihood vulnerabilities and how they affect households. Adu et al. (2018) have revealed that the water-human relationship is the most sensitive component, followed by socio-demographic profile, food, social networks, livelihood strategies, exposure to hazards, and health. Sensitivity is determined by the degree to which a system is modified or affected by an internal or external disturbance or set of disturbances (Gallopín, 2006). For an example of sensitivity in this context, the extent to which drinking and farming are affected by late or lower rainfall (not how late or how lower) can be reviewed. Exposure and sensitivity are linked but are never the same. However, none of these two studies above explored the underlying causes of these vulnerabilities nor how they are linked to human-place relationships.

Arguably, adaptive capacity changes over time, which means adaptive efforts are a valid mechanism to adjust to existing and imminent environmental stress. However, it cannot be confirmed that these efforts are valid forever to carry on living with dignity and well-being (Davoudi et al., 2012; Dow et al., 2013b). There are *social, ecological, technological, and economic* limits to adaptation to climate change (Adger et al., 2009b). Based on social values and ethics, perception towards risks, knowledge, and culture, Adger, with his colleagues, developed four propositions to the sociological limits of adaptation; a) any limits to adaptation depend on the ultimate goals of adaptation underpinned by diverse values. b) adaptation need not be limited by uncertainty around future foresight of risk. c) social and individual factors limit adaptation action. d) systematic undervaluation of loss of places and culture disguises real, experienced, but subjective limits to adaptation.

Before reaching the limits of adaptive capacity, most people remain and engage in precarious livelihoods and are highly vulnerable to environmental stress, shocks, and crises (Jónsson, 2010). Some think of moving to a less environmentally stressful area where livelihoods are less vulnerable, but migration has other uncertainties. Migration may allow escaping from the loss and damage caused by the stressors. However, the new place is likely to have a multitude of other uncertainties and skills that an individual may not demand in the new place. New people may or may not take this individual as one of them. Living in a place known from birth, living among the people mediate the experience of loss and damage. For example, social networks like families and friends create more and more accessible income opportunities (Dapilah, Nielsen and Friis, 2020).

Along with these, internal psychological factors will influence decisions - good or bad memories and dreams stopping them from leaving the at-risk place and going somewhere comparatively unknown. A complex dilemmatic combination of push and pull factors across structural, relational and psychological dimensions form a unique relationship with the place, and life goes on. Traditionally, in many places - such as Bangladesh – rural villages have a long history of settlement (Zwiers, Markantoni and Strijker, 2018). Residents of this place have been living in one place for generations and

working and living in the same place. These people have grown up with environmental stress, and their experience of loss and damage has been ‘this is how it is.’
However, when these places go through the modernisation of farming and fishing, faster transport and modern communication are in hand, new infrastructure is built, and new investments come, traditional income opportunities of these people change. The limits of livelihood diversification decline, and people make more choices to earn more. In this context, economic development and environmental vulnerability meet face-to-face, and traditional characteristics of relations with the place take a new turn. The process of dramatic rural change and upheaval creates new opportunities and threats. Existing theories of human-place relationships accommodate part of this scenario, but it needs a framework that can include voluntary and forced aspects of relationships.

As mentioned earlier, adaptive capacity is not equal to every society, group or individual. Some areas are more exposed, and some households are more sensitive to a set of environmental stress but have less adaptive capacity due to a lack of resources and skills. Some people in the same or similar locations often do not have sufficient financial resources to invest in enhancing adaptive capacities. Besides, the tools for the provision of adaptation are also missing. These shortcomings hit particularly developing countries and small island states. Technological support to these societies plays a significant role in muting the limits of adaptation. Technologies that help climate-smart agriculture and communication between farmers and markets are argued to be able to postpone adaptive capacity limits (Khatri-Chhetri and Aggarwal, 2017; Imran et al., 2018). However, studies suggest that technological adaptation cannot generally overcome all effects of environmental stress (Iglesias et al., 2011; Chambwera et al., 2014).

Similarly, scarcity of resources, market failures, missing markets, and lack of objectives can set barriers to adaptation strategies. As adaptation is highly regional and context-specific, economic evaluation of adaptation options helps support decisions in a practical context. Economic thinking of adaptation has evolved from focusing on cost-benefit analysis and identifying “best economic” adaptations to the development of multi-metric evaluations (Chambwera et al., 2014). The gaps between adaptation needs,

available funds, and skills lower adaptation barriers (Osberghaus, Finkel and Pohl, 2010). Both private and public sectors have a role in identifying adaptation measures and building equitable resilience for the affected households.

Non-migration can be understood in the context of both environmental push and economic pull factors, the latter often explained through the new economics of labour migration (NELM) approach – exploring the network of overlapping social and economic factors, including changing capital conditions (including human and social capital) (Haug, 2008; Hunter, Luna and Norton, 2015), economic aspiration, and remittances across transnational familial networks (Mahmud, 2017; Jorgensen et al., 2019; Van Praag and Timmerman, 2019; Mahmud, 2020). The complex interaction between multiple environmental hazards and other endogenous social and exogenous political and economic risks and opportunities necessitates a holistic and bottom-up research strategy to understand the context in which households make (or are forced to make) non-migratory decisions. It is, therefore, necessary to bring together insight into behavioural responses - such as those commonly framed in terms of *planned behaviours* (Ajzen, 2011), examining the interaction between environmental variability, economic status, and socio-cognitive links that influence affected people's perceptions, motivation and decision-making patterns under stressful environmental conditions (Grothmann and Patt, 2005). Alongside those related to attitudes, subjective norms and behavioural controls as relevant factors are also influencing adaptation decision-making (including migratory and non-migratory responses) (Kniveton, Smith and Wood, 2011). Planned behaviours, however, imply agency – they explain choices *available to* threatened actors but often ignore the broader structural, socio-political, economic, and material constraints (lack of money or other livelihood resources) that can create trapped populations incapable of voluntary migration (Logan, Issar and Xu, 2016; Ayeb-Karlsson, Smith and Kniveton, 2018). Most of this non-migration literature on natural environmental conditions cited recognise agencies and how the agencies are constrained, particularly for poor people.

2.5.1 The framework of the thesis

The specific condition in Bangladesh is that the country is already facing internal displacement from its climate hotspots which are predominantly forced by environmental factors. Many households have migrated from, and many still remain, in its increasing at-risk areas. Therefore, the literature review has revealed migration and non-migration behaviour in natural environmental conditions. Because the highly populated country is booming economically fast, people are migrating for various reasons rather than factors directly linked to environmental stress. The review has also highlighted research on migration and non-migration in increasing stressful environmental conditions. The position of the thesis is that migration behaviour is multidimensional, meaning the migratory decision of an individual is context-specific and not caused by any single factor. It is a complex outcome of multiple pulls and pushes factors which primarily function at the household level. Vulnerability to environmental stress can become a critical contributing factor to migration. On the other hand, literature on non-migration highlights that this behaviour is multidimensional and context-specific and can become a critical factor despite vulnerability to stressful environmental conditions. The research question highlighted in the introduction was as follows:

- *Why do affected households remain under conditions of increasing environmental stress?*

The following section will address the framework which will be adopted to answer the question.

While climate vulnerability is determined by exposure and sensitivity to the impacts of environmental stressors, adaptive capacity is determined by the extent to which humans can adjust or avoid these adverse effects of stress. This study assumes that as the environmental stress increase, affected households' vulnerabilities increase, and they are supposed to migrate. However, by increasing adaptive capacity, these vulnerabilities can be decreased for the time being. Moreover, households with high adaptive capacity

are likely to be less vulnerable. This can explain why some parts of the world are more vulnerable to environmental stress and have less adaptive capacity.

There are at least three terms to communicate at-risk peoples' relations with environmentally stressful places. Place attachment regulates people-environment transactions across various relevant environment-psychological processes (Vaske and Kobrin, 2001; De Dominicis et al., 2015a; Adams, 2016). Albeit, social-psychological factors influence an individual's perceptions of the risk they live in. However, these social-psychological dimensions do not accommodate other factors contributing to these at-risk peoples' migratory behaviour. Place utility is studied within behavioural migration theory, which focuses on satisfaction or dissatisfaction concerning that place (Wolpert, 1965a; Adams and Neil Adger, 2013a; Adie, 2020). It sees the migration decision-making process through the ecological component to a place that is susceptible to environmental change (Baker, 1982; Haer et al., 2017). People at risk take the migratory decision as a form of negative response only when the at-risk people begin to experience residential dissatisfaction.

The sense of place studies the social-cultural dimensions of a place with the adaptive decisions of its people. This Theory engages with, for example, place identity, place attachment, and place dependence and focuses on how these elements influence the adaptive behaviour of the people at risk (Lo et al., 2019). However, none of these terms accommodates an individual's economic, social, cultural, and psychological dimensions, which manifests in the migratory decisions of people at risk for living in a stressful environment. The trapped population is studied in the climate-induced immobility literature. However, the theory somewhat portrays the economic factors from a negative perspective (Logan, Issar and Xu, 2016; Ayeb-Karlsson, Smith and Kniveton, 2018; Ayeb-Karlsson, Kniveton and Cannon, 2020). These scholars argue people at risk continue living in that area because they are unable to leave the place.

Studies have also been carried out to explore a similar scenario and termed limits and barriers to adaptation (Islam et al., 2020). They have explored whether it is their choice to carry on living in those conditions. Islam and his colleague's study have found the scenario highlighting that most of these people at risk are not considering themselves

as “trapped” or have “limits and barriers that are forcing them to remain where they are.” This study acknowledges these terms and finds that it is their choice in most cases, regardless of whether they are informed or uninformed about the actual risks. This study also categorises the factors within the concept of place relations which make more sense in explaining the phenomena of choice to carry on living in at-risk areas.

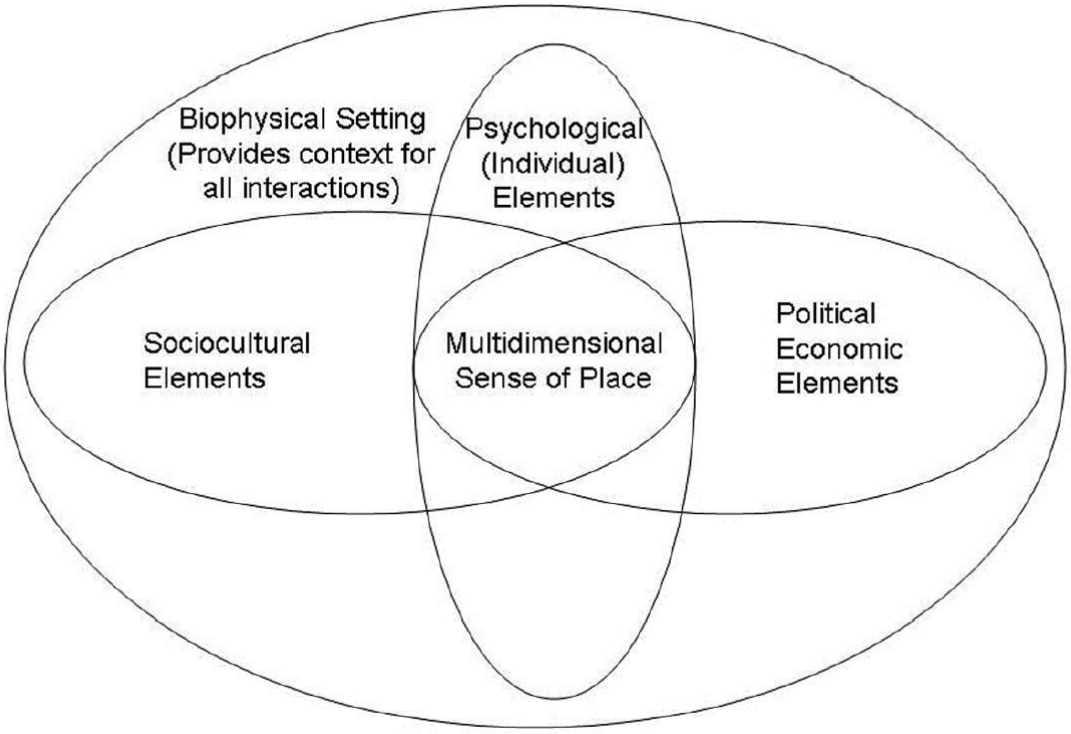

Figure 2.1: Dimensions of sense of place developed by (Ardoin, 2006).

2.6 Conclusion

This chapter identifies the gap in the literature in which migration decisions and actions are differentiated within the exact location. Within the body of human-place relationship literature on natural and stressful environmental conditions, no theories are comprehensive enough to study how migration decisions function in this context. The dynamics of human-place relations in the context of increasing environmental stress need to be studied beyond social, civic, natural, and community identity, dependence, and emotional affinity. With this proliferation of attempts to explore the relationship with a place qualitatively through social and psychological dimensions, there remains a disconnection between theoretical discussion that accommodates the new economic

opportunities and developments. Place-based relationships, especially the sense of place, often arise from an emotional plea to reconnect to the place (Ardoin, 2006; Ardoin, Schuh and Gould, 2012). Sense of place encompasses a multidimensional array that is biophysical and psychological, sociocultural, political, and economical.

This thesis assumes that these interconnected dimensions may have implications for human-place relationships that function in increasing environmental stressful conditions. Some studies explore dimensions of relations to place and their links with environmental engagement (Nicolosi and Corbett, 2018). Studying place relations in the rural context of developing countries needs to engage more effectively to tap the depth and intricacy of how humans make meaning of place. This study accommodates a combination of all these dimensions of place relation and explores the choice or inability or both as a dynamic and context-specific phenomenon and how these relations may change over time.

Chapter 3

Background to the case study of Kalapara, Bangladesh

3.1 Introduction

Bangladesh stands out as one of the most vulnerable countries in the world. A two-degree increase in global temperature puts many places at risk of uninhabitability. So, how the human-place relationship is functioning in Kalapara is an enormous and significant case study with global importance. Before we introduce Kalapara as a case, we briefly explore Bangladesh's migration and development scenario. This is important to look at because migration and development are closely related. During the economic boom, industrialisation and urbanisation took place simultaneously. People from places come where the industries are and join the labour force and live there. Then we look at the climate-induced migration of Bangladesh because differentiating voluntary and non-voluntary, climate-induced, or other forced factors that caused migration is significant. Then we discuss the demography, livelihoods, language and culture of Kalapara. We concluded this chapter by describing the households' exposure, sensitivity and adaptive capacity to the data.

Bangladesh had a subtropical monsoon climate with six seasonal variations in rainfall, high temperatures and humidity in the past. Now the country has only three seasons with minimum seasonal variation. There is a hot, humid summer from March to June with average maximum temperatures of 37^0C, relatively little rainfall and often drought. There is a hot, rainy monsoon from June to October, with heavy rainfall frequently resulting in flooding for up to two-thirds of the country. Moreover, there is a cool, dry winter from October to March with an average maximum temperature of 28^0C. Over 2000 mm of rainfall (about 80% of it during the monsoon) feeds its paddy fields and other crops throughout the year. The storm and flood season begins in May and lasts until November. Heavy rainfall floods most farmlands during the monsoon while the

Himalayan glacier-fed water bursts Padma, Jamuna, Bramhaputra and many other rivers. This is also one of the leading fishing seasons for the fishermen in the Bay of Bengal. Bangladesh has always been prone to natural hazards from monsoon rain-induced flooding and cyclone.

The people of Bangladesh have always celebrated its culture, social and economic norms based on six seasonal environmental changes throughout the year. After the monsoon, when the water recedes, people grow their crops, especially rice. During autumn, winter and spring, fields are relatively dry, and farmers grow vegetables, lentils and fruits. Approximately 50% of Bangladesh's population is primarily employed in agriculture, growing rice, wheat, oil seeds, lentils, sugarcane, tobacco, vegetables and fruits. The growth of agriculture has also been shaped by global capital investment and emerging international markets. Many paddy fields and low-lying lands have turned into fish farms. The share of agriculture among the economic sectors of GDP is fading rapidly (Sen, Dorosh and Ahmed, 2021). In 2019, the share of agriculture in Bangladesh's gross domestic product was 12.68%, the industry contributed approximately 29.65%, and the services sector contributed about 52.85% (Bangladesh Bureau of Statistics, 2019).

Despite magnificent success in reducing population growth, the population density in Bangladesh reached 1239 per square kilometre in 2018 (World Bank, 2018), almost three times (454.9) higher than neighbouring country India and over four times (274.7) higher than the UK. However, the country has slashed its extreme poverty by half since 2000 and became one of the fastest-growing countries in the world in 2019, with an 8.2% annual GDP growth (World Bank, 2019). With this contrast between population growth and economic boom, the country is paying for severe environmental degradation, loss of arable land, extinction of biodiversity and deforestation. Public health and well-being are also being severely damaged because of high land, air, water, and food pollution. Anthropogenic climate change is adding more by increasing extreme weather events.

The agricultural and fishing sectors face acute stress in Bangladesh. Rice cultivation occupies 77% of all cropland, employs 50% of the country's labour force, and provides

95% of all food grain consumption (Xenarios et al., 2015). It is estimated that 80% of farmers reported crop and livestock production suffer from unseasonable rain, limited surface water availability, and groundwater depletion (Aryal et al., 2020). Most rural households produce rice, but only a modest portion sells it – the great majority consume all that they produce (Duncan et al., 2017). Summer temperatures also rise above safe levels for rice cultivation (Ministry of Foreign Affairs of the Netherlands, 2018; Mojid, 2020). This climate and environmental change collectively decrease average gross domestic product (GDP) by -6.17%, and investment declines by -7.76%. The Rice sector is at risk of increasing prices by 5.82 and 8.11%, reducing output by -3.08 and -3.7% collectively by 2030 and 2050, threatening the food security of subsistence farmers (Hossain, Delin and Mingying, 2022). Coastal fisheries in Bangladesh are also affected (Khanam, 2017; Rahman et al., 2020b)). Low-lying lands in tidal flood-prone regions are becoming increasingly saline, forcing the disappearance of native fish species (Miah et al., 2020), and aquaculture infrastructure are facing increased vulnerabilities.

Many adaptive responses to the negative impacts of environmental changes are livelihood shifting which is challenging and often results in *maladaptation* (Magnan et al., 2016). The complex infrastructure of flood defence methods such as polders (embankments) along coasts described as a 'man-made disaster' – are also adding to its existing vulnerabilities (Thomas, 2020)- for example, water-logging, depletion of open freshwater fisheries, sedimentation of river channels, reducing freshwater biodiversity, loss of navigable routes, and higher rates of disease transmission. Marine fishers in the Bay of Bengal are also likely to be affected due to overpollution and poor resource management (Habib, Ullah and Duy, 2014). Collectively, the coastal population is expected to suffer a loss of 1.7 billion USD by 2050 (Das et al., 2020a). Staying longer at home due to increased frequency and magnitudes of extreme weather events reduces the earning capacity of fishers. It increases reliance upon local money lenders (Uddin et al., 2019), thus compounding the financial vulnerability of small-scale food producers while deepening their dependence on exploitative patron-client relations (Wood, 2003). Disaster-affected farmers and fishers move towards non-farm employment as a coping strategy to tackle short-term reductions in their total household income (Eskander,

Fankhauser and Jha, 2016). Non-farm livelihoods in the context of coastal Bangladesh are small enterprises such as corner shops, pop-up stalls, and carts in the coastal markets, or for those with no other viable assets - selling labour in the form of pulling vans, driving rickshaws, and bike cabbing.

Nevertheless, these livelihoods are also vulnerable to climate change. Coastal erosion forces markets to move further inland, and storm surges demolish road and retail infrastructure for long periods. Moving merchandise to safety during cyclones is also a challenge for entrepreneurs. Multi-hazard maps for coastal Bangladesh warn that their vulnerabilities will likely increase by 2050 and beyond (Jahan, Kabir and Chowdhury, 2016; Ministry of Foreign Affairs of the Netherlands, 2018; Kirezci et al., 2020). These challenges to the life and livelihoods of coastal Bangladesh directly impact human-place relationships, so many regions of Bangladesh have become critical case studies for understanding migratory and non-migratory responses to environmental, economic and social stress.

3.2 Migration, Development and Bangladesh

In the last decade, Bangladesh's national development plans produced only 200,000 new formal jobs every year (Khatiwada Sameer, 2013). Therefore, migration has become an important livelihood and employment strategy for rural and urban areas. Every year about a million people go abroad, and 12 million Bangladeshi nationals who are employed overseas contribute to the national economy through remittance (IOM Bangladesh, 2018). Low-paid, less decent dirty jobs in Southeast Asia and Gulf states have been picked up by these people from rural areas of Bangladesh (Rahman, 2012; Kikkawa and Otsuka, 2020). Most of these individuals spend the best working age of their lives in these countries and send remittances back home. Even in the pandemic, along with Mexico and Pakistan, Bangladesh has become one of the three large remittance-recipient countries that registered a rise in inward remittance and received $19.8 billion in 2020 (EIU, 2021). Bangladesh is the eighth highest remittance recipient among the ten countries listed by the EIU report. Remittances' contribution to the economy has risen considerably in recent years, reaching $15.54 billion in 2018, up

14.79 per cent from 2017. The contribution of remittance constitutes 12% of the GDP of Bangladesh.

Nevertheless, these less educated, low-skilled, low-paid labourer migrants are both from cities and villages of Bangladesh. Their hard-earned remittance contributes to creating household assets, health, and well-being, making their family back home more resilient to environmental shocks. Parents, children and wives back home live on remittances sent by their chief-earner family member(s). The money is spent on food, repairing or building a better home, buying agricultural lands, education, medical expenses and festivals (Hossain et al., 2020).

Bangladesh has seen vast improvements in health, education, infant mortality and life expectancy that resulted in continuous per capita income, human assets and resilience to economic and environmental shocks that are robust enough to enable sustainable development (UN Committee for Development Policy, 2018) in achieving sustainable development goals (SDG). Bangladesh is one of the best in the world - it scored 64.2 and ranked 104th among 163 countries (Sachs et al., 2022). According to the 2022 sustainable development report, the country has made substantial progress in minimising poverty (SDG 1), maximising education (SDG 4), responsible consumption and production (SDG 12), and climate action (SDG 13). In the real world, this progress has created new livelihood opportunities in rural and urban areas, and people have migrated, usually from rural to urban, to fill the labour demand. However, it is facing significant challenges in achieving gender equality (SDG 5), protecting life below water (SDG 14), ensuring peace and justice and strong institutions (SDG 16) and building partnerships for the goals (SDG 17). The country is facing a significant challenge in protecting life on land (SDG 15). These challenges have made lives and livelihood shifting more vulnerable to climate change, especially in the climate hotspots which are already disaster-prone. Households from these areas struggle to shift livelihoods, which helps enhance adaptive capacity.

In most cases, these family members never think of migrating to nearby cities unless for the higher education of their young family members. Even if the young members migrate, other family members remain back home. This international labour migration

is different from environmental migration, where entire households migrate permanently, in most cases, not internationally but to nearby cities or villages.

Internal migration, that is, permanent, temporary, seasonal, or cyclical migration to urban areas, has always been a livelihood strategy of the rural poor of Bangladesh (Siddiqui, 2003; Mushfiq Mobarak and Emy Reimão, 2020). However, at the beginning of this century, the migration-poverty interface changed in Bangladesh's migration development. When local crops are harvested, landless peasants, especially men who work in the farmlands, migrate to nearby cities and work as informal labours in construction industries, rickshaw pulling, and factories. They send remittances back home to the villages and return when work in farmlands becomes available again (Biswas, Kabir and Khan, 2019).

Migration as a response to poverty is now seen as migration to enhance development. Communication infrastructures are inefficient, but available transport systems enable people to migrate from rural areas to nearby cities and the capital. Telecommunication and other information technologies help tackle migration's uncertainties. Governments, NGOs and housing companies are modifying policies to ensure they reflect the needs of the female labour force to migrate around the capital city, Dhaka, to work in garment and other factories (Boudreau et al., 2022). People from faraway villages have moved to the outskirts of Dhaka, contributing to Bangladesh's urbanisation (Hossain and Huggins, 2021).

Among these migrants, there is a mixture of reasons why they migrate to the cities. There are many individuals who have migrated to nearby cities with many dreams and purposes associated with city life, leaving their families behind. However, some households migrate from villages and coasts predominantly due to increasing environmental stress.

3.3 Climate-induced migration and non-migration in Bangladesh

Bangladesh has a coastline of 710 kilometres and an exclusive economic zone (EEZ). There is 26 per cent of the total population of Bangladesh lives in coastal areas (Rashid, 2013). Not just its coastal areas in the south but places from the north are also affected by environmental changes. There are variances in the estimated number of individuals who will be moved forcibly by 2050 due to climate change (NSIDM, 2021). The most widely repeated informed guess is 200 million by 2050 (Black et al., 2008). However, one of the challenges in calculating this number effectively is the relationship between migration decisions and climate-induced vulnerabilities. The climate-induced vulnerabilities are multi-dimensional in people's lives and livelihoods. Migratory decisions also have a complex interlinked relationship with their vulnerabilities. It is pretty challenging to align these two and distinguish the drivers of migration and non-migration and how they are linked with climate-induced vulnerabilities. Simply, it is challenging to identify the exact reasons behind someone's migratory decisions and to what extent these reasons are linked with climate-induced vulnerabilities. Having this debate going on, some scientists project that one in seven will be displaced forcefully by 2050 globally (Brown, 2008a). In this context, RMMRU-SCMR estimates that about 16 to 26 million Bangladeshis will have to leave their homes due to floods, storm surges, riverbank erosion, and sea-level rise from 2011 to 2050. Of this, 2 to 5 million will be displaced because of riverbank erosion, 3 to 6 million for inland flooding, 5 to 7 million due to coastal storm surges, and 6 to 8 million due to sea-level rise (Kniveton, Rowhani and Martin, 2013).

However, livelihood vulnerability from inundation, soil erosion, and the heterogeneous effects of environmental change is exacerbated by a lack of adaptive capacity (Kulp and Strauss, 2019), particularly for rural and coastal communities. Coastal regions and islands are also experiencing the effects of sea-level rise, resulting in intense coastal erosion and salinity intrusion into farmlands. The increased frequency and intensity of cyclones have the combined effect of storm surges, high winds and flooding, resulting in crop, private property and infrastructure damage. These limit the adaptive capacity of rural farming, fishing and other business communities. These vulnerabilities are felt

most keenly by the poorest within such communities (Ahmed, Diffenbaugh and Hertel, 2009).

The World Bank reports (World Bank, 2010; Rigaud et al., 2018) that many places in South Asia are at the stage where changes in local climate conditions and seasonal weather patterns are negatively affecting rural livelihoods and living standards (Matin, Forrester, and Ensor, 2018). Bangladesh is a critical case of early observable evidence of forced climate-induced displacement (Kelman, 2018). River and coastal erosion risks, repeatedly inundated homes and farmlands, food scarcity, and economic and non-economic losses create an urgent environmental and development crisis. Reasonable, evidence-based extrapolations from scattered case studies estimate that there are currently several thousand environmentally induced displaced people in Bangladesh, and this number will increase to millions within the next 50 years (Brown, 2008; Lunstrum and Bose, 2014; Bernzen, Jenkins and Braun, 2019; Kulp and Strauss, 2019). The following figure explains the disaster-induced displacement trend in Bangladesh. Figure 3.1 does not include internal displacement caused by accommodating displaced people from Myanmar.

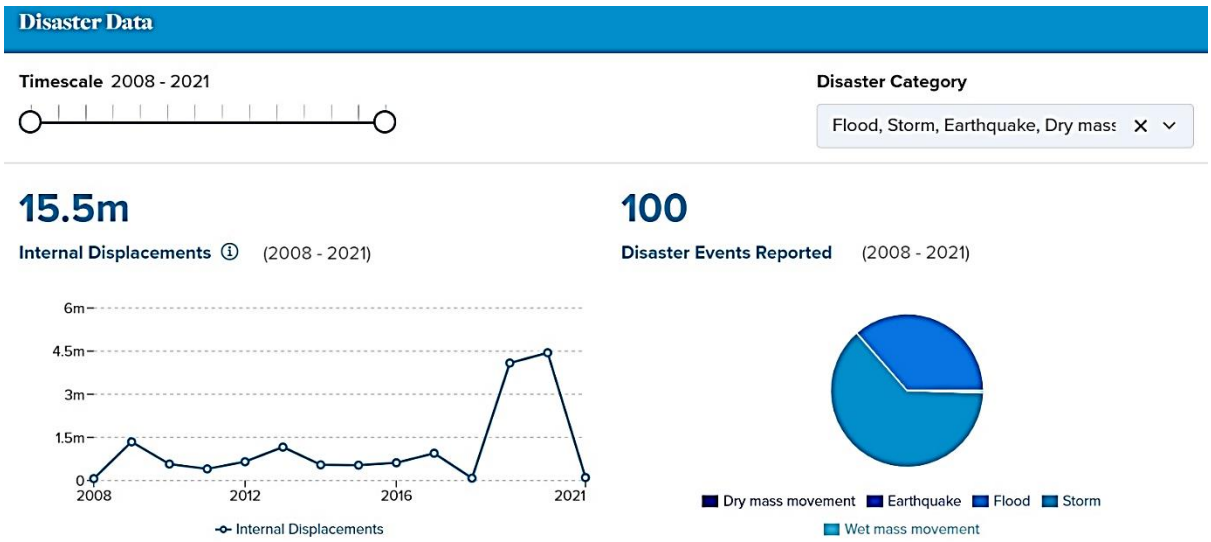

Figure 3.1: Disaster-induced internal displacement trend in Bangladesh (IMDC, 2021)

It was impossible to obtain any regional trend or report on how many individuals or households have been displaced or migrated, which were caused by environmental stress in Kalapara of Patuakhali district. However, local and national media reports

evidencing displaced households from Kalapara taking shelter in slums in Patuakhali, Barishal, Khulna, Chittagong and Dhaka. Without scientific data at the local level, it is difficult to determine when and why some people have been displaced while others have remained.

3.4 Kalapara as a case to study non-migration in Bangladesh

Studying the non-migration of Kalapara in the Patuakhali district has global significance because many areas like Kalapara see a migration of households to nearby cities (Shamsuddoha et al., 2011; Blanchet Therese and Biswas Hannan, 2021). Moreover, many people are at risk of being forcibly displaced because of environmental-induced vulnerabilities (Islam and Jamal, 2015; Bhuiyan MRA and Siddiqui, 2015). Kalapara is urbanising rapidly because of its coasts, a tourist destination in Bangladesh. The livelihoods of these villagers are shifting rapidly from agriculture and fishing to tourism. Tourism has diversified livelihood opportunities; however, it is not any less vulnerable compared to traditional fishing and farming because tourism-related livelihoods, i.e., cabbing, stalls, photography, and hospitality, also remain closed during and after an extreme event. There are many villages across the coasts and in-lands of Kalapara where people are still heavily involved in farming and fishing. Communications and transport networks are improving rapidly, and people are migrating to nearby cities, i.e., Patuakhali, Khulna, Barishal, Chittagong and Dhaka, for many purposes rather than just direct impacts from environmental stress.

Being one of the hotspots of climate vulnerabilities, Kalapara is increasingly experiencing climate-induced stress, such as storm surges, erratic rainfall, reduced fresh water and groundwater scarcity, and increased heat. The villages of Kalapara are being affected by this stress, resulting in a shortage of sufficient livelihood opportunities, freshwater and food security and deprivation of other essential human needs (Ibne Amir and Ahmed, 2013a; Sarmin Ruksana, Akther Shahana and Yasmin Tahmina, 2021).

Some people have already moved out of Kalapara to nearby cities.. If you visit the informal settlements of these cities, it is not challenging to meet households from these

hotspots – who lost their homes, farmlands and livelihoods. The rapid growth of Patuakhali, Khulna's urban population, is primarily driven by rural-urban migration from these vulnerable villages. However, the author found no reliable source, i.e., empirical study or reports at the local level, to mention why these households from Kalapara have migrated and if there were elements that contributed to their migratory decisions.

3.4.1 Brief demography, livelihoods and culture of Kalapara

Climate change impacts livelihoods, food and water security, ecosystems, and infrastructure - vary locally, nationally, and regionally. More precisely, the impacts vary in different levels- community, household and individual where gender plays a critical vulnerability factor. Despite being the sixth most climate risk index in 2017, Bangladesh is the 25th least ready country, meaning that while it is highly vulnerable, it is not ready to mitigate or adapt to the change (Ministry of Foreign Affairs of the Netherlands, 2018). The highest temperatures are in the southwest of the country. The western part of the country also receives the least rainfall. UNDP has ranked Bangladesh as one of the tops in the world regarding vulnerability to tropical cyclones (MoEF, 2009). On average, the country is hit by a severe cyclone every three years(Rahman et al., 2022).

Kalapara, also known as Khepupara, is one of the coastal thanas (sub-district) of Patuakhali in southwest Bangladesh. It lies approximately 320 kilometres south of Dhaka and 48 kilometres from Patuakhali and consists of Kuakata, a long sandy beach along the Bay of Bengal. Bangladesh has made good progress in compiling local-level demographic data on its government websites. However, the lack of data production and management skills at the local level is visible on their public platforms. With limitations, this study obtained most of the following information from the government website of Bangladesh http://kalapara.patuakhali.gov.bd/.

The 2011 Bangladesh census shows Kalapara having 31,324 households and a population of 174,921. According to the government website, 52.6% are male, and 51.5% are counted as educated. The population density of Kalapara is 480 per square kilometre. Like a common phenomenon in Bangladesh, most households have access to mobile phones, and internet users are rising fast. Inadequate, but there are a few mini-

health centres and family welfare centres in Kalapara. The study was conducted in four coastal communities in Kalapara. Tolatoli and Kawar Char are two communities in Kalapara Upazila, whereas Paschim Khajura and Kuakta are in the municipality of Kuakata. All four communities are on the coastal side of Kalapara Upazila.

In the name of religious limitations for Muslim women working in public, women in Kalapara have minimal access to some livelihood opportunities, such as coastal fishing. Kalapara is majority Muslim, similar to other districts of Bangladesh. Therefore, most of the livelihood opportunities in Kalapara are occupied by men. Women from Muslim communities stay home to look after children, small livestock and home gardens. However, many women work drying fish located along the beaches. A modest number also work in local rice mills and ice-making factories for fish processing.

Even though the Rakhain of Bangladesh, who are Buddhist in religion, were first settled in Kalapara, the minority Hindu, Christian and Rakhine populations have seen a decline in absolute numbers in the 2011 census. No credible source was found to present the percentage of women involved in informal labour in Kalapara. Our empirical study uses a place-based strategy for participant sampling, examining household experiences and responses to environmental stress, livelihood shifting and migratory decisions through qualitative interviews with 60 residents in the sub-district (Upazila) coastal town, Kalapara in Bangladesh, as shown in figure 3.2.

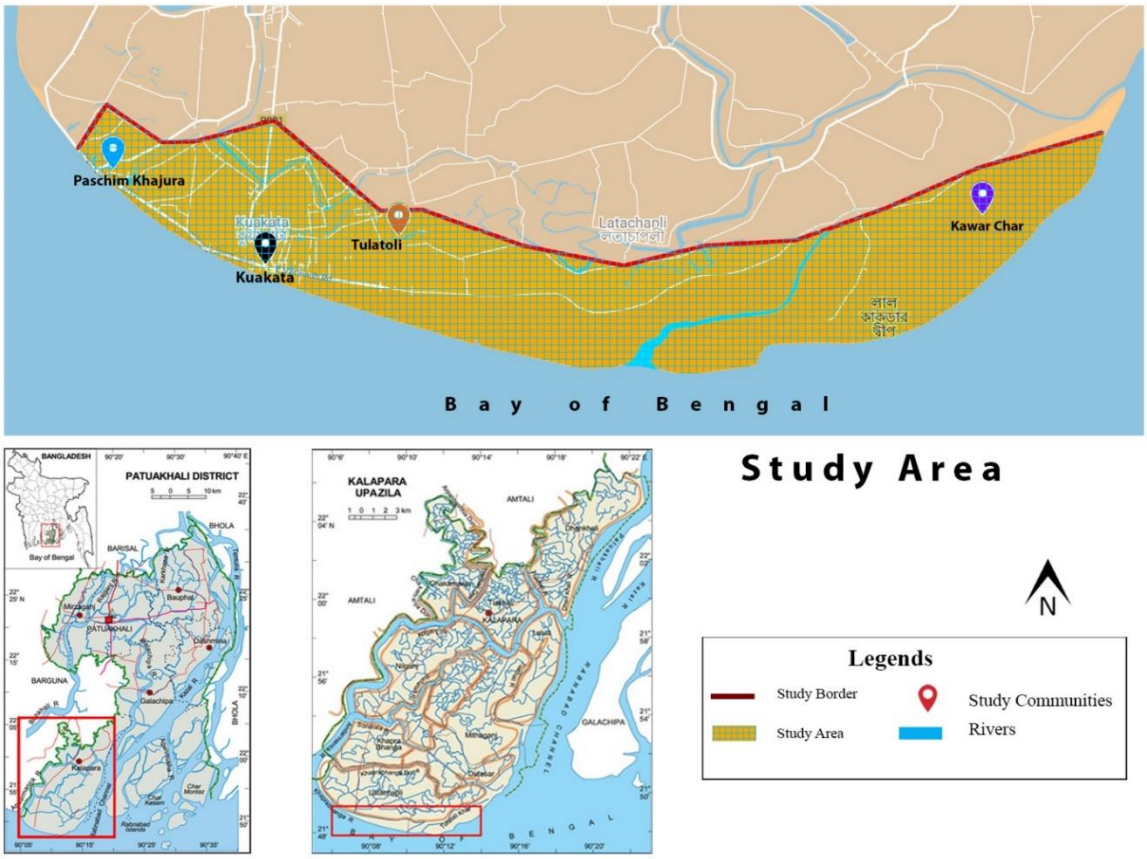

Figure 3.2: Study site in Kalapara, Patuakhali, Bangladesh Source: The author developed these maps using google maps.

3.4.2 Understanding the livelihoods and culture of Kalapara

Tolatoli is a reasonably large community with men working in farming and fishing. There is also a wholesale fish market nearby where many people work at various levels of this community. Kawar Char is an island attached to the mainland of Kalapara. Most men work in fishing boats. Some are not directly linked with fishing, but their livelihoods come from farming rice, vegetables and fruits. Buyers from Kuakata, Kalapara, Patuakhali and Barishal buy their vegetables, fruits and rice at the local markets. Men in Paschim Khajura are mostly fishers who work for Mahajan, the fishing boat owners. Kuakata is a tourist destination with beach markets, hotels, shopping malls, and small shops, most of which are owned by the locals.

Most farmers in these communities are subsistence farmers cultivating rice, lentils, wheat, and various vegetables and fruits. However, any surplus gets sold in the local

markets to cover household expenses. On the other hand, some households get insufficient crops for their requirement throughout the year.

IRRI and BRRI, colloquial names for a range of varieties that have been bred by the International Rice Research Institutes (IRRI) and Bangladesh Rice Research Institute (BRRI), are the most prominent rice crop, followed by local varieties *aus* and *aman* since the beginning of this century. As the IRRI and BRRI varieties are higher in yields, local traditional rice varieties are cultivated less by the farmers in Kalapara. Using modern agricultural technology is still at its beginning stages in Kalapara. However, farmers are becoming familiar with new high-yield varieties (HYV), machinery and production processes. Because of HYV IRRI, production has increased, but this production is hampered due to increasing extreme weather events. Changes in precipitation patterns have increased the demand for underground water for irrigation. Therefore, this area's underground water level has gone further down during the IRRI season. IRRI also demands more pesticides and fertilisers. So, the production cost is much higher than the traditional *aus* and *aman*.

Kalapara supports two types of fishing; a) coastal fishing from the Bay of Bengal and b) farming fish by altering traditional farmlands. People who have their fishing trawler, called Mohajon, hire fishing labourers from local sources. These fishing labourers are either poor farmers or extremely poor (destitute) who cannot grow sufficient crops for the household for the entire year. So in the non-fishing season, they farm their lands or work in informal labour industries. The informal labour sector is full of income uncertainty, and these people usually end up being in debt to the *mohajon*. There are also fishing labourers who do not have any farmlands or are physically unfit for inland informal labour. Those who work in the fishing industries take loans from the *mohajon* to cover household expenses paid off by working in the fishing boats during the fishing season. The security of getting access to this emergency loan is in exchange for working for the *mohajon* in the fishing season.

Some farmers have farming lands in flood-prone areas, where the government has built polders to save homes and farmlands from flooding. Farmers build walls in their farmlands. If the farmland is in the polder, farmers reserve freshwater on their fish farms

during the rainy season. These people farm freshwater fish for six to nine months, and during the spring, they sell the fish and grow rice before the rain beings again. Farmlands in the polder get more opportunities to grow rice and other crops than the farmlands outskirt of the polder. There are also fish farms out of the polder in the riverbanks and canals, which get seawater during the high tide. These people can only farm saltwater fish and can hardly grow rice during the dry season because of the high salt concentration in the soil. If a cyclone hits, fish and crops of the farmlands outskirt of the polders get entirely washed away, and it takes multiple years to rebuild the farm and soil to become compatible with the farm again. Farmlands in the polder are not safe from the cyclone, depending on how strong the storm surges are. If the storm surges topple the polder with strong winds, all crops and fish are gone. Once seawater gets into these farmlands in the polders because of salination, it takes years before these farmers can grow crops again.

The loss and damage of these subsistence farmers of Kalapara have become irreparable. These farms are not insured, nor do these farmers have savings to reinvest to rebuild the farms and buy seeds and necessities to make a successful recovery. Once a disaster hits them, the farmers have no alternative but to get a loan from local *mohajon* or microcredit organisations. These organisations are well known as *shudkhor* in Bangla, loan sharks for their highest interest rates. The farmers have to return to their farmlands because farming is their only livelihood. Secondly, this ensures their household food security, *khoraki* in Bangla. Without farming, they will have to ensure a well-paid alternative livelihood to support the household, which is more challenging with the existing skills and labour demand.

However, these people have limited alternative livelihoods. Female members in the better-off households have a small number of hens, ducks, goats, cows, and buffalos. They can support the households by selling eggs, milk, and calves in an emergency of crop failure. To these female household members, this livestock is crucial not just for their own financial needs but also for the entire household. However, feeds for this livestock come from the farmlands. If a disaster hits the farmland, then this livestock is no longer a stroke of luck. Instead, they become a burden for the household.

Kuakata, a tourist spot in Kalapara thana is booming. So, informal but new livelihood opportunities are being created, and local people who used to have no alternatives in the past now have more opportunities to earn their living. Hotels, restaurants, street food stalls, shops in the beach markets, and cabbing have increased livelihood options in Kalapara.

A small number of people from Kalapara migrate to Patuakhali, Khulna, Barishal, Chittagong and Dhaka for education and work. As in other rural livelihood settings, people work and live where they were born. These people have a strong sense of community compared to urban areas. Extended family and friends form strong social networks help find work and livelihoods in nearby cities. Access to mobile phones, the internet, and mobile money transfer facilities boost economic and social development in the area. Farmers and fishers are getting an up-to-date price for their products. Roads and transport systems are improving in Kalapara; hence business networks are spreading fast to faraway cities of the country.

People from Kalapara, mostly men, migrate internationally as unskilled labourers to southeast Asia and middle-eastern countries. Individuals either sell lands and properties or take out loans to go abroad. Many migrants can save enough capital to start a business back home. Upon return, these people run businesses and work on farms to make a living. In increasing environmental stress, these subsistence farmers, fishers and labourers sink into debt. They cannot bear essential household expenses, afford to send children to schools, or offer minimum household health and well-being.

3.5 Disaster Profile and nature of vulnerabilities of Kalapara

Today, many people in Bangladesh live in unprotected areas subject to frequent coastal flooding (if not below the high tide line), coastal erosion, or structures on or above water. These are common but still poorly documented. Bangladesh is one of the countries least ready to tackle its vulnerabilities from increasing environmental stress. Readiness measures a country's ability to invest and have the 'know how' to convert resources to adaptation action by considering economic, governance and social circumstances. The impacts of increasing environmental stress are earnestly experienced here in Kalapara.

The vulnerability of Kalapara means to what extent the communities are exposed to climate change, how sensitive their communities are and their level of ability to cope with the economic and non-economic loss and damage caused by the environmental stress. Because it threatens everything, from food and water to ecosystem service, health, human habitat and infrastructure security, studies show that though crops productions have increased, food security at the household level has decreased in Kalapara (Ibne Amir and Ahmed, 2013b). Higher production costs, low market prices, population increase, and frequent natural disasters have contributed to this food insecurity. On the other hand, the sea wall, the use of modern technology and saline-tolerant seeds in agriculture, and increasing climate awareness might have contributed to the increase in overall food production.

Kalapara is a multi-hazardous place which means the place is at risk of multiple slow and gradual onset disasters. Currently, the dominant local environmental disasters for Kalapara are cyclones, storm surges, fluvial-tide flooding, coastal erosion, and encroaching salinity (Ahamed, Rahman and Faisal, 2012; CEGIS and GoB CDMPII, 2013; Hasan and Akter, 2019). There is too much water during the rainy season and too little water in the winter in Kalapara. The rainy season has become shorter, and heavy rainfall occurs within a shorter period. Heavy rainfall in a shorter period causes flooding. Floods occur in July and August every year, and many farmlands remain underwater for months. These floods have devastating effects on food and water security. While farmlands are underwater, not just humans but their livestock go hungry due to the lack of grass fields. There are no central water supply systems in most of the communities in Kalapara. Tubewell is their primary source of household water. These tube wells go underwater and become unusable during floods and cyclones. The waterborne disease spreads out because of the absence of safe drinking water. Moreover, floods contribute to the further salinisation of coastal lands of these communities in Kalapara, causing loss of harvests and productive agricultural land. It is important to note that each community in this area is affected by multiple hazards simultaneously, with complex contemporary and future impacts on livelihoods.

A significant increase has been observed in cyclone frequency during the cyclone seasons. Kalapara was affected by Bulbul on the 9th of November 2019, Amphan on the 20th of May 2020, Yaas on the 26th of May 2021, and Sitrang on the 24th of October 2022. Although a new concrete coastal defence structure is being built across the coasts, most embankments are still poorly built, and a small cyclone makes thousands of homes, farmlands and habitats quite sensitive to storm surges and saline water intrusion. These structural vulnerabilities have long-term impacts because once the land is flooded by saline water, it takes a few years before farming again. Also, fish farm walls are washed away, and rebuilding is costly. Despite existing challenges in accessing capital and credits, structural vulnerabilities keep the coastal dwellers highly sensitive to storm surges. These structural and financial vulnerabilities have long-term impacts on the well-being, i.e., depression and anxiety of the affected households. Lessons are learned through facing loss and damage; however, different types of constrains lead to maladaptation (Arman, Salam Shaoli and Hossain, 2022).

There are cyclone shelters in Kalapara where households take refuge with their key household belongings However, life and livelihoods are still quite sensitive to cyclones because of poor emergency response management systems. Albeit, Bangladesh has made substantial progress in implementing early warning systems, and the result is visible in reducing human deaths. But, the immediate and longer-term impacts on livelihoods are very sensitive to environmental stress. Livestock in rural households is often used as emergency support. When a large amount of cash, i.e., medical, wedding, education, is required, they sell the livestock and overcome the challenges. Without an impact-based flood early warning system, these households cannot always protect their livestock during the emergency response. Current cyclone and flood forecasting matrices, technology and communication tools, operating procedures, training, and outreach are not fully protecting farmlands, crops, fish, home gardens and livestock (Sai et al., 2018). Delta dwellers of Kalapara have loss and damage experience repeatedly, but their adaptive capacity has enhanced very little, predominantly due to increasing exposure to a set of sudden and gradual onset disasters while having structural and financial constraints.

Significant sea-level rise has been measured in the coastal regions of Bangladesh, with 4 mm per year at Hiron Point and 8 mm in Cox's Bazar, less than 100 km west and southeast of Kalapara, respectively (Sharmin and Islam, 2013). Sea level rise has been one of the factors that led to an increase in soil salinity. The embankment protects Kalapara from flooding, saline water intrusion, and sea-level rise, at least for a certain period. However, the rest of the slow-onset disasters would increase environmental stress on life and livelihoods.

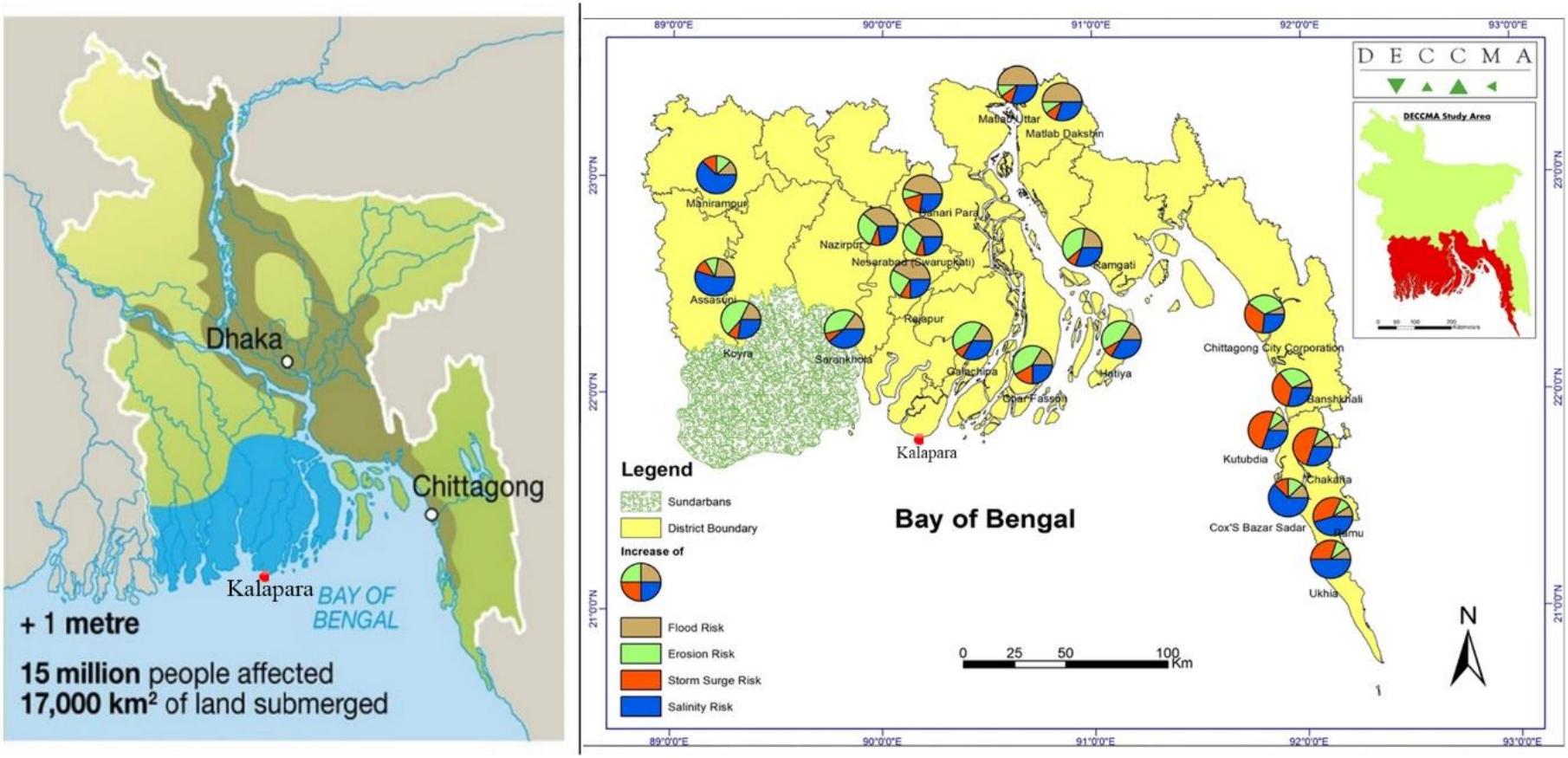

Figure 3.3: On the left, the blue shadow shows projected land loss for a one-meter sea-level rise, and Kalapara is at risk of being washed away in the Bay of Bengal. On the right, the disaster profile map shows hotspots where risks due to climate change will increase. Despite a similar scenario, there is no risk profile specifically for Kalapara.

Source: (Jahan, Kabir and Chowdhury, 2016; Ministry of Foreign Affairs of the Netherlands, 2018).

The future climate change projection for Bangladesh is quite fearful. Both temperature and rainfall will increase significantly. Mean annual temperature is projected to increase by 1.8^0C by 2060 and 2.7^0C by 2090 (compared to 2010), although some projections suggest increases up to 4.4^0C from 2070 onwards (compared to 1970-2000 mean) (Roy, Rahaman and Kumar, 2009; Karmalkar et al., 2012; Karmakar and Das, 2020; Choi et al., 2021). The question is, what does it mean to a 1.8^0C to 4.7^0C increase in the ecology and daily life of Kalapara? Scientists are confident that this increase in temperature is going to cause a decline in ocean productivity, damage to ecosystems (i.e., mangroves, seagrass and other ecosystems), and changes to ocean chemistry (Hoegh-Guldberg O., Jacob D., Taylor M., Bindi M., Brown S., Camilloni I., Diedhiou A., 2018). To the fishermen of Kalapara, a reduction in fish catch means their fish-related livelihoods and industries are at substantial risk, even though the current availability is satisfactory. The temperature increase is linked with vector-borne disease. Therefore, malaria and dengue fever are projected to increase in Kalapara. The rising frequency and magnitude of the cyclone have already affected tourism in Kalapara. Beach markets, hotels, and many other relevant livelihoods are projected to be even more at risk due to the increase in temperature.

With the existing knowledge gap, out-migration in agricultural-dependent communities is positively and statistically significant with temperature increase. These effects are even more evident in developing countries where agriculture is still a major economy (Martin et al., 2014; Falco, Donzelli and Olper, 2018). Households which do not practice climate-smart agriculture and where authorities struggle to implement climate-proof development are more sensitive to shocks. Households in these conditions are at the front of vulnerabilities and have minimal options to practice in-situ adaptation. The recent regional evaluation shows the growing number of climate-induced displaced people in Kalapara (Shamsuddoha et al., 2012; Bernzen, Jenkins and Braun, 2019), making this a place of research essential for the study of environmental migration and non-migration. Above mentioned four communities were selected across the coast of Kalapara. The selection was to provide interview respondents with various significant livelihood sources (farming, fishing, and small businesses) within the communities.

3.6 Place relations of the people in Kalapara

Although there are many reasons why people are migrating from and to Kalapara, three major motives are commonly underlined in the context of urbanisation and environmental stress (Alam and Mamun, 2022b). People from Kalapara migrate to nearby cities for work, business, education and family. This migration has substantial positive economic and social impacts on households at both the origins and destinations. Environmental stress is not still a direct and primary determinant of their decision to migrate. Migration in Kalapara is a standard demographic phenomenon like many other rural areas of Bangladesh. However, there is still a substantial knowledge gap about the migration scenario of Kalapara and its motives.

From a development perspective, the reallocation of labour from the agricultural sector to the tourism sector is a vital ongoing factor in Kalapara. So, there are cases where people from nearby cities and Dhaka come to Kalapara to invest and work in the tourism sector. People migrating to Kalapara are seen as another usual urbanisation and development phenomenon where skilled labour and more prominent investors are required to function in the process of industrialisation.

There are also cases where people from Kalapara are migrating as part of their risk-coping strategies, especially the destitute (extreme-poor), the most and earliest victims of climate change. The destitute have no farming lands of their own, nor do they own homes of their own. They work on somebody else's farmlands, businesses or boats and rent huts and shades of others. These people have no savings and no assets, but they are local and have strong relationships with the place, like wealthy people. Everybody in the community, these destitute, are similarly affected by the same disasters. However, their sensitivity and adaptive capacity are different from the rich. It is not who is more or less sensitive, but rather how and what they are sensitive to is crucial to building effective adaptation strategies. People with assets, i.e., boats, lands, businesses, and livelihood capitals, are also sensitive to disasters. The vulnerability types might differ, but the boat owner and fishing labours are all vulnerable to disasters.

The main challenge in this vulnerability context is adaptive capacity. The extremely poor are the lowest on the ladder in adaptive capacity. The better-off community

members have multiple livelihood sources, which help them minimise sensitivity and maintain their adaptive capacity. Adaptive capacity is one of the critical aspects of place relations.

Being a rural area in coastal Bangladesh, people commonly live in their ancestral lands and properties. There are homeless and stranded people; whose ancestral homes have gradually been swallowed up by the sea. Their adaptive capacity reached the limit, and they migrated to nearby Patuakhali, Bagerhaat or Khulna. However, not everybody had gone to the city. They have built camps on the embankment. Their other family members might have migrated to Patuakhali and Khulna.

3.7 Major livelihoods and their nature of vulnerabilities in Kalapara

There are four types of significant livelihoods in Kalapara. In Kalapara, all livelihoods are more or less vulnerable to the effects of storms, salinity, and coastal erosion. Agriculture and fishing are the primary sources of income in Kalapara. Despite severe coastal erosion in many places in the area, recent tourism-focused development has added several new livelihoods. These disasters make livelihood strategies, social networks, health, food, water, and socio-demographic profile more challenging. These livelihoods and their vulnerabilities can be seen through the lens of livelihood vulnerability indicators. This section will briefly discuss how significant livelihoods have become vulnerable in Kalapara.

Every aspect of livelihood faces devastating scenarios after every disaster. For example total of 81 cyclone shelters in Kalapara are used as schools (Islam and Jamal, 2015). The schools also remain closed for weeks and even months. Hotels and beach entertainment services also remain closed. Repeated disaster experiences have impacted people's physical and mental health over the years. After every cyclone, hundreds of people get injured, and many live with permanent disabilities. The financial and non-financial losses and damage caused by disasters have not been thoroughly researched and accounted for.

The exposure factors and sensitivity components have exceeded the adaptive capacity of many in Kalapara. The livelihood vulnerability index (LVI) estimates that households living close to the coast are more vulnerable to natural disasters and climate variability factors than those living away from the coast (Toufique and Yunus, 2013). During the cyclone, seawater inundates the farmlands and fisheries and destroys most of the freshwater resources. Once land is inundated by seawater, traditional crops can not grow for years. Storm surges destroy both earthen and semi-earthen sea walls and roads. Toufique and Yunus have also found that the damage to livestock and household items was also greater on the coastal sides than inland. They are worse off in terms of the availability of amenities, health care, education and training. Their dependency ratio is also relatively high. Weaker housing structures in rural areas also make these coastal people more sensitive to disasters. After every cyclone, fishing boats get destroyed, fishermen get injured, and they become unable to return to work and consequently become in debt to pay for hospitals.

Most of these people in Kalapara still depend on natural resources to maintain their livelihoods. It means that the grace of nature regulates the livelihoods of these people. Any changes in rain patterns, cyclones, storm surges, and salinity intrusion directly and severely impact their livelihoods. Exceeding the poverty trap in the increasing environmental stress is more challenging than ever for these households. Table 3.2 shows the IPCC vulnerability index (Hahn, Riederer and Foster, 2008) of two communities, Pashchim Khajura and Kuakata, located in the Kuakata municipality. Higher numbers mean higher vulnerability, where Latachapli is highly vulnerable to a lack of fresh water and scarcity of natural resources. There is no vulnerability ranking found for other two communities.

IPCC contributing factor	Components	Tiakhali	Nilganj	Mithaganj	Latachapli	Lalua	Khapra bhanga	Dhulasar	Dhankhali	Chakamaiya
Adaptive strategies	Socio-demographic profile	0.27	0.28	0.25	**0.36**	0.34	0.34	**0.26**	0.26	0.27
	Livelihood strategies	0.26	0.27	0.26	**0.35**	0.35	0.36	**0.25**	0.25	0.26
	Social Networks	0.29	0.27	0.23	**0.25**	0.28	0.26	**0.27**	0.23	0.26
	Food	0.33	0.33	0.36	**0.37**	0.38	0.41	**0.30**	0.39	0.32
	Natural resources and economy	0.45	0.41	0.39	**0.41**	0.41	0.39	**0.31**	0.36	0.34
	Water	0.35	0.38	0.36	**0.41**	0.42	0.43	**0.37**	0.36	0.37
	Health	0.36	0.40	0.39	**0.26**	0.27	0.28	**0.32**	0.38	0.34
	Cyclone, warning and impacts	0.34	0.34	0.31	**0.42**	0.41	0.42	**0.32**	0.32	0.31
LVI		0.34	0.34	0.32	**0.37**	0.37	0.37	**0.30**	0.32	0.31
Rank		2	2	3	**1**	1	1	**5**	3	4

Table 3.1: Vulnerability of Kawar Char and Latachapli in Dhulasar and Latachapli. Source: (Islam and Jamal, 2015)

3.8 Conclusion

Kalapara is not a desirable destination for the rich, as seen in many European or North American coastal towns. Weather-dependent livelihoods, i.e., agriculture and fishing of Kalapara, are directly influenced by increasing environmental stress creating extra pressure on food security, livelihoods, health, and well-being. According to the government website, all 12 unions, the lowest administrative units of Kalapara, have been declared prone to disasters. However, we could not reach any local flood or cyclone risk maps, emergency disaster response plans, or resilience or adaptation policies for hundreds of thousands of people.

Early warning systems are implemented by the Cyclone Preparedness Program (CPP), Red Crescent Society, and members of the local councils of Kalapara. Recently,

television and smartphones have made information more accessible to remote areas like Dhalasar. However, most of these households still remain in the dark about how their livelihoods will be impacted and how to secure them from disasters. Fishermen, subsistence farmers, and unskilled workers in informal sectors in Kalapara are left with minimal opportunities to make their livelihoods resilient to the existing and imminent disaster risks.

The vulnerability profile and migratory behaviour make Kalapara a significant case to study in the area of disaster management, planned relocation, and issues related to displaced people in and beyond national borders. The next chapter discusses the methods and theories used to examine the non-migratory behaviour in Kalapara.

Chapter 4

Theory and Methodology

4.1 Introduction

This chapter explains the research methodology and theories to examine the research question. It begins by determining the appropriate level of study and introduces the methodological framework which will be used to answer the research question. The chapter then discusses the interview and thematic analysis, which are the methodology to test the research question. A semi-structured interview set is used to unveil what binds these households with the land threatened by the impacts of increasing extreme weather events. Finally, NVivo, the computer-aided qualitative data analysis software (CAQDAS), is used to examine the data, form data groups, and explore the inter-relational links among the groups. The interpretive approach is getting acceptance among scholars for qualitative analysis. This chapter is solely concerned with the methodological aspects of the thesis. Details on the application of the methods are in the following empirical chapter.

In the context of the increased sudden and gradual onset of multi-hazardous places, migration decision is not determined by just economic pull factors or environmental stress as push factors. Moreover, it is unclear how exactly migration behaviour occurs in this particular context of increased sudden and slow environmental stress. In the context of sudden-onset disasters, i.e., cyclones, households have no time to think and have no options but to flee and take refuge in cyclone shelters. They usually return and invest every capital they have left to recover from losses and damages. However, in places like Kalapara, where they have sudden-onset disasters, i.e., cyclones and coastal erosion, along with slow-onset disasters, i.e., salinity and water-logging, the migration and non-migration, both decisions are complex and long term. Because, the nature of losses and damages from slow-onset disasters are not felt overnight. In an increased at-

risk condition, losses and damages slowly reduce the coping and adaptive capacity. Despite loss and damage being predictable and common, it is challenging to anticipate, detect, and understand the vulnerability and take migratory decisions accordingly. This is why examining the drivers qualitatively and categorising them in a way to help understand their interlinking relationship is essential to project migratory responses of places like Kalapara. The theory of place relations, especially with its components and dimensions, offer us to examine how these decisions are taken.

As a result, it was decided to investigate what unites these people in their homes and how those bonds evolve due to their experiences of loss and destruction. A neutral theory that can comprehend the alteration of bonds with the place is required to investigate this phenomenon. As a result, the concept of place relations is considered to investigate the research question.

Two main methods are used in the thesis, semi-structured interview and thematic analysis, which promise complimentary epistemological points of view to each other. The semi-structured interview focuses on economic and non-economic loss and damage experiences. It also focuses on social, economic, and psychological questions to explore the bonds with the place. Components of grounded theory are used to generate the themes. Such integration has great promise for understanding risk behaviour (Delante, 2019; Strang, Che and Vajjhala, 2021).

4.2 The scale of the study

The human-place relationship is not just between an individual and the place. Different actors at different levels, i.e., community, local, regional, national or global, play a role that influences this relationship. Climate-induced migration is difficult to examine because of the complex multidimensional nature of the relationship. Methodological issues arise due to migration caused by slow-onset environmental phenomena like salinity and inundation owing to sea-level rise. One of these challenges is at what scale this kind of migration decision is taken. Studying why people remain in stressful environmental conditions needs to be held at a specific scale where migratory decisions

are made. In the context of war or sudden-onset disasters, involuntary migration is less likely a matter of individual or household choice. A large number of people from the affected area are forced to flee at the same time. This type of displacement can be temporary or permanent. However, for economic and gradual environmental stress, these decisions are more likely to be made at the household level (Gubhaju and Jong, 2010; Dustmann et al., 2017) because disasters-induced risks play a crucial role in migratory decision-making. Moreover, at least before reaching its limit, the capacity to make successful migration depends on financial and social means, most of which function at the household level. Migration decisions are likely to be made at this stage when the land is swept away, and all adaptive options other than relocation have run out. These decisions, however, are influenced by local, regional, and national actors.

Climate-induced migration and non-migration, disaster displacement, planned relocation or retreat, and migration decisions in the context of climate-induced vulnerability have a history (Tabucanon, 2014; Castelli, 2018). Both scales of study have been debated and acknowledged; nonetheless, most of these studies have been defined and quantified on an individual scale. The approach included social, economic, and political contexts of exposure and sensitivities of the communities to disasters. The approach has been implemented to build adapting capacity for vulnerable communities, especially in developing countries.

Many development researchers have argued that community-based adaptation (CBA) has become a popular term that can solve most environmental vulnerabilities (Huq, 2011; Westoby et al., 2020; Soanes et al., 2021). However, it is unclear where the community as a level of adaptation decision-making sits at the global, national, local, household, and individual levels (Titz, Cannon and Krüger, 2018). Community is also internally divided by livelihoods, assets, gender, and many other economic, social, and demographic differences. In the rural areas of a developing country, the adaptive capacity of households with land and livestock is not the same as those who are landless and do not have livestock. So, the question remains of how adaptive initiatives must be applied to all community members.

The current adaptive mechanisms are avoiding the multidimensional nature of environmental vulnerabilities and inadequate power mechanisms in adaptive decision-making, causing maladaptation. Scientists have preconceived concerns about what homogenous communities can do on their own without access to global information, resources, finance, and outside expertise (Spires, Shackleton and Cundill, 2014; Fenton et al., 2014). Scientists have often believed that CBA does not preclude transformation in social relations and emphasises overcoming potential barriers to equitable resilience (Ensor et al., 2018; Kirkby, Williams and Huq, 2018).

These absences of collaboration among the agencies bring inequities in socio-political structure and power relations within communities. These inequities make the adaptation, including migratory decisions, less effective and more likely to produce maladaptive outcomes (Wong and Guggenheim, 2018). The local actors do not always have more outstanding agencies to define, prioritise, design, monitor, and evaluate adaptation actions with support from higher levels. So, considering the community as the level of study is not appropriate where sensitivity and adaptive capacity are not expected. Sensitivity and adaptive capacity are determined at the household level. Therefore, this study considers households as the study level, where migration and non-migration decisions are also made.

4.3 A critical case study approach

Critical case studies, an in-depth examination of a single social unit that permits deductions of the type 'if this is (not) valid in this case, then it applies to all (no) cases' requires a strict, detailed systematic plan to investigate a social totality (Flyvbjerg, 2006a). The journey starts with defining the task and the topic. The researcher needs to have a clear and concise hypothesis explaining the question that the case study will answer. One of the primary methods used in this case study is the semi-structured interview. The semi-structured interview questions are developed based on the existing scientific studies around the research questions and kept open so that the interviewee can answer with deep and detailed insight into the question asked (Osaka and Bellamy,

2020). After gathering all the data, the researcher organises the data and creates a report that begins by telling the reader the conclusion to the research question.

To investigate the non-migratory behaviour of a multi-hazardous place with a set of sudden and gradual onset disasters, we need to draw a detailed empirical analysis, a case that provides a specific focus on the relationship of the people with the place, Kalapara. It was determined to use extensive, in-depth household-level case studies to contribute to disaster-induced migration or relocation management policy and practice. Because of the scale of studies, we understand how households make decisions and the kind of relationships that influence them to conclude the non-migration decision. As a research strategy, critical case studies are often used in exploratory research of a real-life situation or event to illustrate relevant theories and ideas that have not been proven but have scientific merit (Ghorbani et al., 2021).

This critical case study research aims to deconstruct the notion of environmental migration by analysing the nature of relationships and how they transform as disaster risks increase over time. Through this, the study can attain the most prosperous possible understanding of the cause(s) and the complexity of the behaviour patterns of the bounded system. By capturing a range of perspectives, as opposed to the single view of an inquiry, instead of using multiple sources of data, researchers want to gain a comprehensive understanding of the subject (non-migration behaviour in Kalapara) in the complete way possible. Data in a critical case study can be qualitative (i.e., observation, surveys, interview, text, artefacts, etc.), quantitative (data sets on an inquiry), or both to probe an idea, question or hypothesis. An intensive study using critical cases not just helps develop new research; as society changes, the critical case study is used to question existing theories, i.e., climate-induced migration and give new insights (Hohnen and Hasle, 2011). In this case, this study hypothesises that climate-induced migration and non-migration are heavily contextual, a mixture of voluntary and non-voluntary aspirations, and temporal.

This research strategy has some challenges with these advantages of critical case studies. A common criticism of critical case studies is that many studies cannot be replicated and, therefore, cannot be generalised. However, if the participants are

selected carefully, commonality in the data is identified and explored in greater detail, and the findings can have wider relevance. Another common criticism of the case study is that since humans are normal to be subjective, the author can form a bias during data collection and interpretation. In this regard, the interviewee can also be less confident in giving the true answer in detail, thinking of being identified. This criticism is usually controlled by going through a strict and detailed ethical review process while identifying the potential areas where the researcher is likely to be biased.

4.4 Ethical principles

The practice of research ethics entails the application of fundamental ethical principles to research activities, such as the planning and carrying out of research, respect for society and others, the use of resources and research outputs, the detection of scientific misconduct, and the regulation of research (Hesse et al., 2019). For in-depth case studies, it is crucial to spend good time with the interviewee and introduce the researcher, the objectives of the research, how the interview data will be used, and how strictly privacy and identity will be managed. This process enables confidence in both the researcher and the participant. Explaining all these aspects of research ethics and obtaining consent can take time. However, protecting respondents' confidentiality in research is paramount, especially involving human participants. The researcher must provide a dynamic, informed written consent where the researcher must explain how personal information and data will be handled at the collection, analysis and dissemination stage. And before data collection begins, it is a must that the researcher must explain how identity and data content are going to be used and to what extent these will be shared with researchers and in public.

The setting of the interview is the most crucial for obtaining maximum quality and accurate data. The participants are frequently strangers and are often asked to respond to specific questions in a time-restricted environment. So, neither the researcher nor the participants know much about each other's mental landscapes regarding the interview. These circumstances offer methodological and ethical problems that require consideration by both parties. The author of this study was familiar with the

community's livelihoods, culture, and language. These familiarities allow the researcher to obtain the trust of the interviewees faster. However, the researcher is a male and building good relation with the female household members at the beginning of the interview process was challenging. Often, conservative Muslim women are not allowed to have conversations with adult men beyond their close family. When asked if women could join the interview process, many male participants allowed their female family members, and many did not feel comfortable. The researcher was aware of these religious limitations and hired a local female to attend with the researcher while asking questions. With the presence of the hired female assistant, more female participants were interested in attending the interview with the researcher. Otherwise, the researcher valued these gender relation limitation and carried on without female participation.

Creating a space where the researcher and the respondent interact is crucial because this can lead to more engaging and reflective data. How best this interaction can happen is usually termed ethical conduct, and researchers must pass through a rigorous inspection process by ethics committees within the university. The researcher submits a subsequent research plan underpinned with specific consideration related to the participants' values and sets out a straightforward design that the respondent must suffer no loss of personal distress and be treated without prejudice, discrimination, and equal limits and freedom of the academics within the practising law. After drafting the data collection strategy, questionnaire, consent forms the full outline of the research, a formal application for ethical approval was sent to the environmental ethics committee at the University of York. The committee examined the application and returned it with approval through email. Upon receiving the confirmation, the data collection was officially started.

It was ensured that the consent form was translated into the local language (Bangla) to make the participants well aware of the research and the questions. The goal of the research, how their audio-visual interview and personal information will be used in research and kept confidential, were explained orally before the face-to-face interview. Their right to withdraw was explained, and a signature was obtained. The research did not ask for the highest formal education received. However, all participants signed in the consent form. The researcher also signed in the consent form, and a copy was given

to the participant. Small-size cameras and audio recorders were shown and kept in front but discrete of the participants to avoid any discomfort of being recorded. No participant rejected the interview offer due to the audio-visual recording, and no noticeable discomfort was found. Audio-visual interview data was kept in an encrypted drive before uploading to a more secure place, the university network drive. All information on the camera memory cards was irreversibly erased as soon as it was copied to the drive.

4.5 Data collection strategy for this study

The major livelihoods and their nature of vulnerabilities in Kalapara have been explained in section 3.7 (page no 74-76) of this thesis. However, this study collects data from only four communities within Kalapara. Standard inclusion and exclusion criteria could not be followed due to the absence of relevant data at the community level. It was observed that fishing and farming were major livelihoods in Kalapara, but no credible source (government websites and academic literature) was found on how many households primarily rely on fishing and farming and in which community they live in Kalapara. Informal livelihoods, i.e., daily labour, are quite usual to support the fishing and farming sectors. Many people are involved in small businesses, i.e., shops, stalls, and rikshaw pulling. The researcher observed and asked civil society members about the communities where more of these people live in Kalapara. The researcher also considered communities highly exposed to the sea and farmlands not protected by concrete embankments. The Researcher also visited the local bazaars and bitch markets and identified members involved in small businesses and informal labourers.

The interview is a technique widely used among researchers of human geography to understand a subjective aspect of a group of people about the environment. In general, the technique reveals the participants' desires, emotions, prejudices, and memories, among many other concerns. However, due to cultural, gender, age and many other differences, interviewees are not always open with the researcher at the first instance, which may formulate shallow responses. That prevents researchers from consistently understanding the interviewees' point of view, especially when involving sensitive

issues, i.e., household financial constraints, strategies and health. Numerous sittings with the interviewee and making the researcher and the research topic are essential to establish rapport and build trust in exploring these complex or obscure issues. Time and finding constraints add to these challenges.
It is important to emphasise that all research has limitations inherent to the methods employed (Pessoa et al., 2019). A good interview consists of the engagement of the interviewer and interviewee in the process of elaboration and collective understanding of the subjective context exposed by the interviewer. Only responding to the questions asked by the interviewer descriptively does not have the opportunity to share the meanings of reality. To truly understand what they meant to say, engaging with each other, validating the topic, and explaining the content critically are essential for a meaningful study. Being able to connect on that level with the interviewee in just one meeting is complicated because the time limit usually does not allow for reflection on the interviewee's answers to the questions.

To ensure the data quality, the researchers require to reflect upon the research process (data collection and analysis) to assess the effect of their presence and their research techniques on the nature and extent of the data collected. The researcher must critically observe and assess to what extent the respondents are telling what they meant to tell and whether the data collection methodology helped or restricted the collected data. Critically means researchers are expected to reconceptualise if the research question fits the methodology of data collection and the pros and cons of any alternative methodology that can be applied to explore the research question.

As the literature review chapter argues, assessing the components of place relations is problematic. Neither traditional qualitative nor quantitative methods can overcome the challenge of why people carry on living where lives and livelihoods are pretty vulnerable to multiple hazards and when is the moment to leave. Traditional approaches are not suited to combine or categorise these complex sets of reasons. The interview questionnaire is used as a research tool which is created for this study of multidimensional relationships with the place.

Interviews have been used to explore risk perceptions and adaptation decisions, but interviews which seek to investigate multidimensional relationships with a place are still rare. The literature review highlighted the approaches which have attempted to explore human-place relationships; most scholars have only explored a single dimension of relationships. However, the human-place relationship is not one-dimensional, meaning people live somewhere, not just because of psychological or economic or not just because they cannot leave. It is instead possible to be a combination of all. The current study fills this gap in the academic literature by combining and organising the variables that characterise people's relationships with places. This study's dimensions of the human-place relationship are conceptually different to Ardoin and his colleagues (Ardoin, Schuh and Gould, 2012). They argued that the biophysical, psychological, social, and political-economic components of human-place linkages as the components of the sense of place.

The empirical exploration of the place relation theory accommodates social, environmental, psychological and economic drivers which influence attitudes, values and behaviours. The model is a good fit for normal environmental conditions. One of the reasons may well be that most people are usually motivated to feel optimistic about where they live and work. Thus the notion is that people would, overall, be influential where they have grown up, have strong social networks and work locally.

The participants of this study may have overall uncertainties and bad experiences, but not repeated dreadful experiences and uncertainties directly coming from extreme weather events. This is why the study is not comprehensive enough to consider how these dimensions create voluntary and non-voluntary relationships in stressful conditions. This study classified the emerging characteristics as "voluntary" and "forced," which describe the nature of the drivers of place relations in order to analyse human place relationships more holistically and accurately in stressful environmental settings.

Community Name	Number of Participants	Major Livelihood Sources
Paschim Khajura	Three couples, ten men and women	Fishers and Farmers
Tulatoli	Four couples, nine men and three women	Farmers and Daily Labourers
Dhulasar	Two couples, ten men and three women	Fishers and Farmers
Kuakata	15 men	Business people and Farmers

Table 4.1: Participants and their livelihoods

4.6 Crafting the interview questionnaire

The research involved in-depth semi-structured interviews designed to explore local community experiences of disaster impacts, the socio-environmental context of their work and home life, and their decision-making regarding migration and non-migration from and within the region. The random purposive sample of 60 interviewees from four communities was selected to ensure a broad array of livelihood experiences were captured. The sample also covered representatives of different wealth categories, i.e., middle class (grihostho), poor (gorib) and extremely poor (dustha). Attention was paid to those with locally-situated livelihoods so that shared experiences (such as loss and damage from repeating extreme weather events) could be captured across the interviews (Adeola, 2007). However, it is important to note that though extreme weather events affect the whole community, not all participants across each livelihood category experience them in the same way; and each has a different adaptive capacity in the face of such threats (Fischer and Chhatre, 2016). Within the non-random sample, we aimed to recruit across low, medium, and high-income households, with respondents in each livelihood category. Adaptive capacity also differs across ethnic and religious groups (Sen et al., 2020), so local diversity was taken into account, including respondents from minority Rakhine communities.

There are many different ways a question can be asked. The methods of framing a question are pretty important regarding what the researcher is looking for from the respondent. A thorough, in-depth question can help us understand the participant's feelings. However, starting with simple questions and allowing the interviewee to get familiar with the subject is also important; so that they can seemingly interpret the content and produce unbiased narratives of the experience. A good question must be easy, logical and precise in language so that the participant understands and can relate to the subject. A lousy question is likely to have multiple interpretations, which confuses the interviewee, usually results in misinterpretation, and generates biases in the data. On the other hand, a good question confirms a single interpretation, and the interviewee can relate to his or her experience. In an interview, multiple questions are asked; in this case, chronological order is essential to ensure consistency in the response. The interviewee needs to be able to recount and, at the same time, able to distinguish between causes and consequences.

These initiatives increase the possibility of generating excellent reliability in the data and trust in the study. Perhaps the greatest merit of the interview as a method of data collection is the value of grasping, in a reliable way, the participant's perception of their own reality. The following semi-structured questions were designed based on the above conditions:

Question 1: What do you like about living here? How has that changed since the last decade?

The first part of the question is easy to take the interviewee to the land of positive human-place relationships. However, the question is likely to generate multiple answers. It means that the question intends to explore something that the interviewee likes about living here. It is less likely to have any experience related to environmental stress. Among the reasons, it can have something related to his or her livelihoods and attachments. The response is then linked with the second part of the question in the context of environmental, social, and economic changes in the last ten years. There is no minimum length of time that is required to be able to note any visible changes in a

place. However, for an adult to notice any changes in their area, they must have been there for a sizable amount of time.

Question 2: What do you NOT like about living here? How has that changed since the last decade?

The first part of the second question takes the respondent to his or her negative experiences of human-place relationships. The question was very open-ended in the context of environmental stress. However, the researcher was familiar with the participants and was confident that the participants were highly likely to highlight the stressful scenario of the environment. One of the reasons behind this confidence was that the participants were either farmers, fishermen, small businessmen or in informal work. These livelihoods are all highly exposed to environmental stress.

Question 3: What are your sources of income at the moment? Have your livelihood (sources and conditions) changed in the last decade? Has environmental change got anything to do with it?

The first part of the question was to explore the participants' livelihoods. The second part of the question was to explore if the livelihood has been heavily affected by disasters. The third part of the question was to understand if the participant is familiar with climate change and has any level of consciousness about how his or her livelihood has anything to do with climate change. The Bangla term for climate change, 'Jalobayu Poriborton', is unfamiliar to the participant.

Question 4: Has cyclone Bulbul influenced your livelihood in any way? Like Bulbul, how have other environmental stress (i.e. erosion, salinity and sea-level rise) affected your livelihoods and asset profile?

Cyclone Bulbul hit the study area just a few weeks ago. The participants were still going through the loss and damage to their livelihoods. Paddy fields were flattened, and vegetables were rotten in the fields. Fellow fishermen colleagues were lost in the sea during the cyclone. Most fishermen had to stay home for weeks and borrow money from the fishing boat owner. There was no tourist for at least two weeks, and business was

closed. There was no demand in the informal job sector. So, the memory of loss and damage was still alive. The question was asked to explore to what extent the livelihoods have been affected by cyclone Bulbul. The question would help to understand the importance of livelihood security in a stressful environment. The participants did not know about climate change. However, when asked if the frequency and magnitude of cyclones have changed, the researcher received mixed answers. Some said the frequency and magnitude of the cyclone have increased. Some answered 'no'. Maybe because the participant never thought about the disaster scenario critically to notice the change. This specific event in recent memory has methodological benefits. It allows participants to talk about specific actions rather than some idealised notion of what people might do in the future or a fading memory in the distant past.

Question 5: Can you not leave this place and migrate somewhere safer? Or you don't want to leave this place? Or a mix of both? If you had to go, where would you go?

The previous questions were set to know the participants' position within the place-livelihood-environment nexus. As these people have experienced the impacts of disasters multiple times, they are highly likely to have thought of changing environmentally dependent livelihoods or moving out of the area. The second part explores if the migratory decision (either moving out or carrying on living) is voluntary or non-voluntary, or dilemmatic. The third part of the question helps us understand how affected people who want to migrate value a certain destination for migration. Together, this set of questions explores a broader context of the participant's migratory decision in stressful environmental conditions.

Specific efforts were made to include women in the interviews, though cultural barriers concerning household roles and interaction with male interviewers limited women's participation. Most women in Kalapara do not work in fishing boats. A small number of women work in the fish processing industries, in the shops in the tourist markets. Women also do home gardens, grow vegetables, and farm livestock for in-house consumption and selling in the markets. So, they have direct participation in overall household income and livelihoods. Therefore, this study tried to include all household

decision-makers interviewed whenever possible to optimise the quality, as adaptive decisions are usually joint efforts of the household members (Hossain et al., 2017). On the first day of the data collection, some participated with their male household member and contributed to answering the questions. Some hesitated to talk to strangers. From the second onward, the researcher hired a local male and female to support the interview process. This enhanced access to female participants but could not ensure equal participation from both genders in the interviews.

In-home recordings of all interviews were made with responders. There were no inducements to participate. Interviews were done in Bangla, and audio-visual recordings were made using a camera. Transcripts in Bangla were created and translated into English. The principal author speaks both languages. English transcriptions were coded using computer-aided qualitative data analysis software NViVo™ using thematic analysis. The tool helped organise relevant node and code arrangements and visualised critical elements. Experiential, relational and expressive values and code and analysis follow the process of description, interpretation, and explanation. In practice, interview data were analysed through a multi-level framework of coding – from top-level thematic coding to establish the context and production processes of broader themes, subsequently followed by a more detailed examination of utterances to better understand the psychological, socio-cultural and political-economic context and to produce an interpretive framework (Baxter and Eyles, 1997; Braun and Clarke, 2006a). Emergent perspectives were mapped into a top-level thematic coding framework shown in figure 5.1 (in chapter 5). Results are presented as dimensions of human-place relationships built from this interpretive thematic analysis.

4.7 The process of data analysis

The methodology of data collection and analysis is the core of credible qualitative research. The lack of focus on a research process's rigorous and relevant analysis has severe implications not just on the result but pollutes the relevant body of knowledge. Thematic analysis is not tied to a particular epistemological perspective. Rather, it is a flexible yet complex process of identifying underlying patterns or themes within

organised qualitative data to address the research assumptions or say something about an issue (Maguire and Delahunt, 2017). The data collection and analysis must have been done precisely, consistently, and thoroughly for the research to have that credibility, allowing the reader to follow the process and validate it (Nowell et al., 2017). Thematic analysis is a helpful method of examining surprising insights within a data set as it forces the researcher to take a well-structured approach to data collection and analysis and produce an organised final report.

However, there are challenges to following this approach and producing a credible study. Unlike grounded theory and ethnographic analysis, there is a lack of conducting rigorous thematic analysis. This leads to uncertainty about how to avoid descriptive analysis and generate underlying patterns in the data that were aimed at earlier before beginning the data collection. In other words, not having substantial literature on thematic analysis, flexibility and complexity of this research methodology can lead to inconsistency and lack of coherence when developing a theme and can coherently underpin the study's empirical claims.

To address these challenges, the method chosen for this study is Braun and Clarke's (2006a) guideline through six phases of a thematic analysis, including the 15-point checklist of criteria for good thematic analysis. It is important to note that these guidelines are applied flexibly to fit this study's research questions and data.

Phase	Description of the Process
Familiarising with data	Transcribing is a form of interpretation of raw data. Reading and re-reading the transcripts and noting down initial ideas.
Generating initial codes	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
Searching for themes	Collating codes into potential themes, gathering all data relevant to each potential theme.
Reviewing themes	Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating an athematic 'map' of the analysis.
Defining and naming themes	Ongoing analysis to refine the specifics of each theme and the overall story the analysis tells, generating clear definitions and names for each theme.
Producing the report	The final opportunity for analysis. Selection of vivid, compelling extract examples, the final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

Table 4.2 Phases of thematic analysis. Source (Braun and Clarke, 2006a)

The interview data were coded using an inductive approach, where the content of the data leads to coding and topic formation to divert into the response. This study codes the qualitative interview segments into clusters of similar entities within conceptual categories and identifies consistent patterns and relationships between themes to come up with a theoretical explanation of the phenomenon under the study. The approach is useful in establishing the generalizability of inferences and developing more vibrant and nuanced interpretations of a phenomenon (Chawla, Eijdenberg and Wood, 2021). The approach can also incorporate criteria and techniques to enhance reliability and validity. Such techniques as coherence in the body of data that generates novel explanations offer new problems or solutions in a consistent and contradictory manner. Following is the explanation of how this study is going to maximise the thematic analysis method to obtain the best result:

4.8 Understanding the communities through their language

All scientific enquiry which involves the use of more than one language needs to include a thorough description of the translation-related issues, problems and decisions involved in the different stages of the research process (Birbili, 2000). It is essential to describe explicitly the techniques used to conduct the translation process. Because conducting research in a different language has always been a barrier for the scientist. Collecting data in one language and presenting the findings in another impact the validity of the research and its report. The researcher and the translator must thoroughly understand the language, culture, and research issues to maintain the data's quality and validity. When the researcher and the translator are different, the quality of translation is influenced by the translator's linguistic competence and knowledge of the study participants. Suppose the researcher and the translator are the same people. In that case, the autobiography of the researcher-translator, the researcher's compatibility in academic writing, and the researcher's understanding of the study's language and culture all influence the translation quality.

One of the significant difficulties in translating qualitative data is gaining the conceptual equivalence or comparability of meaning. One good example of such a case is trying to translate an interview; even a familiar term or expression for which there is direct lexical equivalence might carry 'emotional connections' in one language that will not necessarily occur in another. The communities in Kalapara speak Bangla but in a different local accent and terms. I, the author, am a native speaker of Bangla. However, I am not entirely familiar with all the local terms of Kalapara. For example, in standard Bangla, the term migration is Abhibāsan. However, the participants do not use abhibāsan to describe migration. Instead, they use *bidesh*, abroad in English. Participants have different colloquial words to describe different disasters. These terms are not the ones in formal Bangla. For example, they use *Baishya* to describe cyclones. Baishya is a close term for Barsha, which means rain in English. So, when they are describing a cyclone using the colloquial term Baishya, it is easy to miss-translate rain instead of cyclone by the translator.

A few other words like these had to be translated from formal English to formal Bangla and then translated again into colloquial terms to produce the interview questionnaire. The same process had to follow while translating the interviews into English. The following terms that the researcher-translator encountered during data collection:

Formal English	Formal Bangla	Colloquial Bangla
Adaptation	Abhijōjan (অভিযোজন)	Tike Thaka (টিকে থাকা)
Climate Change	Jalabāẏu paribartana (জলবায়ু পরিবর্তন)	Not available (স্থানীয় শব্দ পাওয়া যায়নি)
Cyclone	Jhor (ঝড়)	Bashya (বাষ্যা)
Disaster	Durjog (দূর্যোগ)	Durjog (দূর্যোগ)
Farmer	Krishok (কৃষক)	Chasha (চাষা) / Grihosto (গৃহস্থ)
Flood	Ban'yā (বন্যা)	Bashya (বাষ্যা)
Livelihoods	Jībikā (জীবিকা)	Kaj-kam (কাজ-কাম)
Migration	Abhibāsana (অভিবাসন)	Bidesh (বিদেশ)
Resilience	Sahanaśīlatā (সহনশীলতা)	Khap Khaiye Nea (খাপ খাইয়ে নেয়া)
Risk	Jhuki (ঝুঁকি)	Bipod (বিপদ)
Salinity	Labanāktatā (লবণাক্ততা)	Nonapani (নোনাপানি)
Sensitivity	Sambēdanaśīlatā (সংবেদনশীলতা)	Not available (স্থানীয় শব্দ পাওয়া যায়নি)
Soil Erosion	Bhumi Kṣaẏa (ভূমি ক্ষয়)	Bhangon (ভাঙন)
Vulnerability	Arakkṣhita (অরক্ষিত)	Not available (স্থানীয় শব্দ পাওয়া যায়নি)
Destitute	Nishwa (নিঃস্ব)	Gorib (গরীব)

Table 4.3: List of Keywords translated into colloquial Bangla

The process of gaining comparability of meaning is greatly facilitated if the researcher has proficiency in a language and culture. However, languages have their local accents and terms that are different to the standard version of the language. Formal language is

not always fully understood by the participants. Usually, a literal translation could be seen as doing more justice to what participants have said and helping readers understand the foreign mentality better. At the same time, free translation is easy to understand but has a greater risk of losing original information. Only then can a researcher pick up the full implications that a term carries for the people under study and make sure that a word's cultural connotations are explicit to the readers of the research report. A different kind of translation problem occurs when terms in English do not exist in the language of data collection. Where quotations are resistant to translation because of incompatible terms between languages, pseudo-information or the loss of information can occur and influence the quality and even validity of the study. For one example, in this study, I used the formal Bangla term of resilience, *Shahanshilata* and explained circumstances and examples, *khap khaiye nea*, familiar to the participants.

Phase 1: Familiarising with the data

The author is of Bangladeshi origin, and Bangla is his first language. He is familiar with the participants' livelihoods, culture, customs, and dresses. The verbal data was collected, which means the interviews were conducted by himself in Bangla through interactive means in Kalapara, Bangladesh. So the author had some prior knowledge of geography and the people of the area. He had some assumptions about what the data might look like. After recording the conversation, the author protected the information with an encrypted hard drive and listened to it again to become fully acquainted with the depth and breadth of the content. After flying back to York, UK, the author produced complete English transcription of all the interviews. The researcher argues that selecting part of an interview and partial selective transcription is risky, especially when understanding the context is critical. Partial transcription can generate bias during the inductive coding and produce results that may not be accurate. Instead, the researcher took time, repeatedly read the English version and matched it with the Bangla audio-visual. The author wanted to make sure that the transcription is a verbatim account of all verbal utterances (Clark et al., 2017). Dealing with cross-language research where data was collected in a different language than the report's language is quite challenging.

Challenging because transcribing bilingual data, i.e., words and phrases that have local meanings defy translation while keeping the meaning unchanged, is difficult (Halai, 2007). Currently, translation issues are seldom discussed in the method section of English articles reporting research with non-English data (van Nes et al., 2010). The research describes and discusses how translation has been carried out in order to strengthen the understanding of reviewers and readers and increase the trustworthiness of the research. Transcription and translation inform the early stages of analysis, and the author develops a more thorough understanding of the data. During this period, the author searched for meanings, possible patterns or semantic themes before beginning to code the data formally.

Phase 2: Generating initial codes

At this stage, the author starts listing what is in the data and what is interesting about them. Interesting means finding relations and similarities in the data while keeping the research question in mind. For example, a basic segment of an interview talks about a particular topic, i.e., how salinity has damaged a farmer's paddy field in the last ten years. The researcher keeps the topic in mind and looks into other interviews if this same topic has been discussed. For example, if four interviews have discussed how salinity has damaged a farmer's paddy field, then a semantic code, a code that is not necessarily the same formal code at the end, generates a pattern in the data.

<Files\\Interviews\\Farmers\\Interview 13> - § 1 reference coded [2.85% Coverage]

Reference 1 - 2.85% Coverage

FS-TL-03: Salinity was a problem in the past. The Embankment has stopped.

<Files\\Interviews\\Farmers\\Interview 23> - § 1 reference coded [4.64% Coverage]

Reference 1 - 4.64% Coverage

FR-KL-02: The most fear comes from the flood. Salinity is another problem. But we live in such a place, where salinity is normal.

<Files\\Interviews\\Farmers\\Interview 34> - § 1 reference coded [6.71% Coverage]

Reference 1 - 6.71% Coverage

ML-KW-01: If the embankment remains intact, then saline water does not create much of a problem. It still pours in which reduce the harvests. we get only one rice crop per year. It is during the rainy season when sweet water is available on the surface. We get to farm Robi crops (i.e. watermelon, potato, daal, etc.) in our higher farms.

<Files\\Interviews\\Multiple Livelihoods\\Interview 18> - § 1 reference coded [17.85% Coverage]

Reference 1 - 17.85% Coverage

Salinity can't be controlled by the government. This is the grace of Allah's. We get one crop only throughout the year because of salinity. The new embankment might help us grow a second one.

Figure 4.1: How a pattern develops in the data and leads to a node in NviVo. This data set was initially coded as 'risk perception on salinity intrusion—source: Author.

At this stage, working systematically through the entire data set and giving equal attention to finding repeated patterns across the data is essential. Because, at this stage, the author needs to look for as many potential themes or patterns as possible. Each pattern also needs to be as inclusive as possible so that each theme contains the context entirely.

Phase 3: Searching for themes

The author needs to keep in mind that no data set is without contradiction, and there is no thematic map that is absolutely out of inconsistencies within and across data items. However, if the researcher sticks with the study topic and keeps developing themes, all the data will have been coded, and a big list of themes will have been created.

List of Codes generated from the data collected for this study		
Coastal Erosion	Migratory Decisions	Non-formal Jobs
Negative Impacts of Coastal Erosion	Migration	Recent Development
Changes in Coastal Erosion	Migration Destinations	Local Disaster Profile
Adaptation to Coastal Erosion	Nearby Cities	Cyclone
No Impacts	Family Elsewhere	Coastal Erosion
Disaster-specific Adaptation	Up to God	Flooding
Cyclones		Salinity
Changes in Cyclones	International Labour Migration	
Adaptation Measures	Local Authorities to adopt policies	Sense of Place
Negative Impacts of Cyclones	Diversify Livelihoods	Place Attachments
No Impacts	Stay as Usual	Place Dependence
		Place Utility
Existing sensitivities	Non- Migration	Social Bonds
Response during Emergency	Administrational Entanglements	Geographical Constraints
Remained at Home	Insufficient Means	Poor Governance
Safeguarding homes and livelihoods	No Alternative Skills	Place Identity
Took safe shelter	Physical Constraints	Place Obduracy
	Psychosocial Constraints	Place Relations
Salinity Intrusion	Social Constraints	Risk Perceptions
Adaptation Measures	Livelihood Opportunities	Experiential
Changes in Salinity Intrusion	Fishing	Socio-Cultural
Negative Impacts of Salinity	Farming	Demographic
No Impacts	Small Business	Cognitive

Table 4.4 Semantic themes generated while exploring underlying relationships related to the research question. Source: Author

At this stage, the author plays around with different codes using tables and mind maps and considers how different codes may combine to form an overarching theme. The relationships between codes and between different sub-themes and themes produce a map.

Not all these codes are useful; neither all the maps produces are relevant to the research questions. However, some themes and codes might need to combine, refine and separate to get to the final thematic map. Some codes that did not fit into the main themes are discarded, and maps are abandoned. The following theme was discarded at this stage:

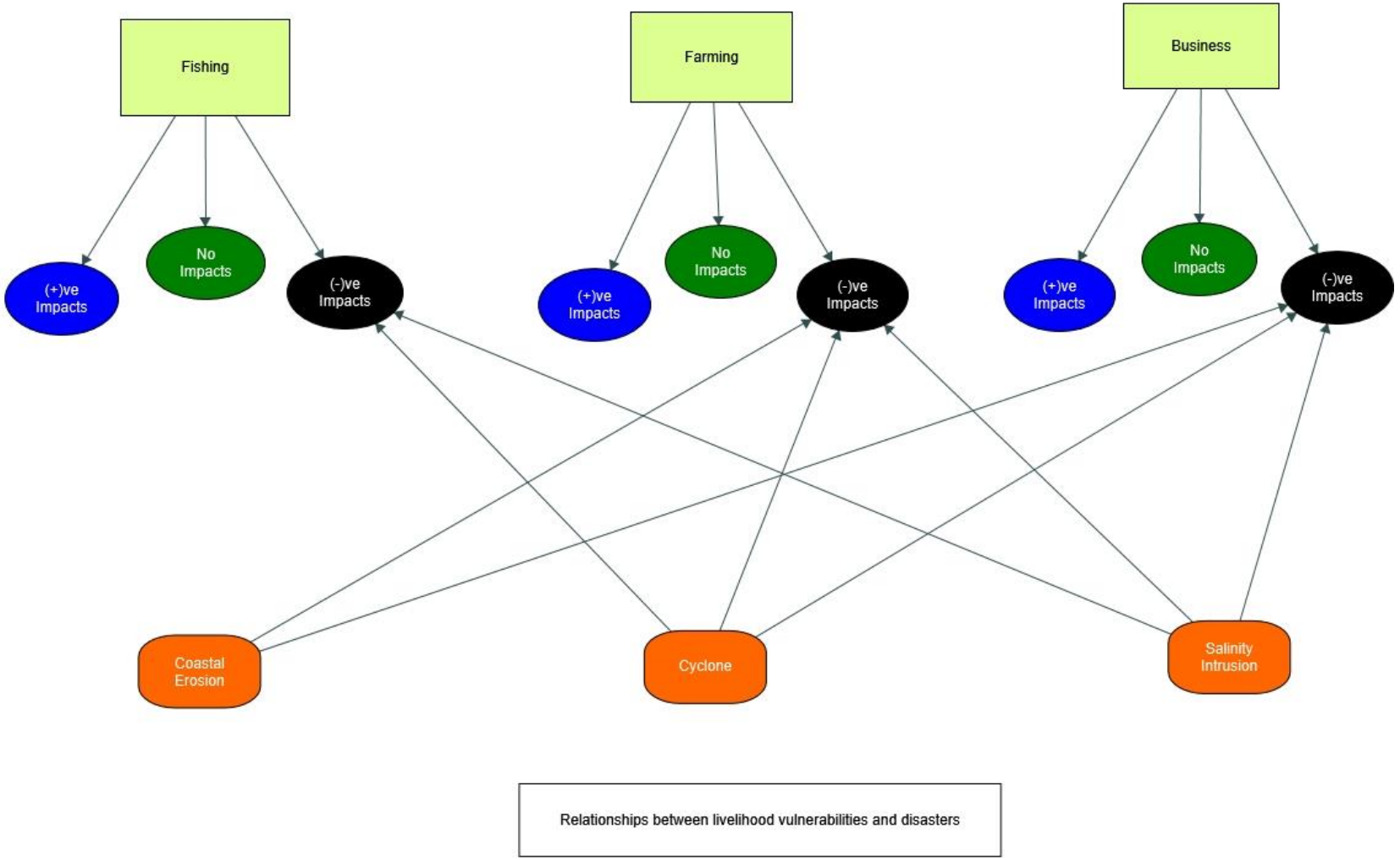

Figure 4.2 An example of a discarded map that was produced initially. Discarded because the study area is exposed to a set of sudden and gradual onset disasters, and vulnerability is not entirely disaster specific. Source: Author

Phase 4: Reviewing the themes

At this stage, the author reviews and refines the codes and themes. The author reads data related to each code and checks if there is any problematic data that does not cohere with other data in the set and differ from the meanings. The author works again with that code and ensures all extracts are united and give a meaningful code. The author also looks for additional data that might fit under this code in the entire dataset. Data that cohere together and give meaning are potentially significant for the study. Recoding from the dataset is also normal.

Once the author has individual themes, it is time to check if the themes reflect the candidate's thematic map. Thematic clusters that consider the theoretical framework is more likely to generate meaning appropriate to the data set. Two sets of themes served as the foundation for this study. The first one discussed why people continue to live in unpleasant situations. The second one discussed how livelihoods and disasters are related. The second was done to understand if overall risk perceptions are disaster-specific. Moreover, if the human-place relationship, by any means, can be explained through a particular disaster. However, in reality, the participants of this study are affected by most of the disasters simultaneously. Therefore, the human-place relationship could not be explained by one specific disaster. Enough data do not simply support some themes. For example, only a few participants mentioned and are heterogeneous to each other internally collapse.

Phase 5: Defining and naming themes

The first thematic map seemed to be satisfactory. However, the researcher needed to recode some parts of the data and rename the codes to make the themes fit smoothly with the data and the research question. Each theme needs to be specifically refined and defined, meaning each theme looks to have sub-themes, and they need to be clustered to determine the full aspect of each theme. The author had to go back and read the data repeatedly to ensure each sub-theme was consistent and represented the narrative in line with the research question. Each theme needs to have a detailed analysis of why and

how it has become a theme based on the data. The analysis needs to be supported by quotes from the data to prove how the theme fits the data.

At this stage, the study had four main themes and multiple sub-themes. Sub-themes are also a theme within a theme. In combination with sub-themes, a broader theme is identified that demonstrates a more meaningful structure to a larger theme. This study has four overarching themes that address the research question 'why do people stay on in an increasingly stressful environmental condition'. For instance, "place obduracy" was one of the overarching themes and was represented by four other sub-themes. 1. A sense of location, place identity, place dependency, and place relationships. The four subthemes listed above make up the overarching dimension of "place obduracy." The voluntary relationship with the place is represented by three of the four overarching themes. One of the overarching themes represents the non-voluntary relationship with the place. All four overarching themes clearly define the research question and give the reader a sense of what the themes are all about. The result chapter discusses how these dimensions form place relations, interact with each other, and within which migration and non-migration decisions are taken.

Phase 6: Producing the report

As all the sub-themes and overarching themes have been identified and the thematic map is confirmed, it is now time to tell the complicated story so that the report can convince of the study's merit and the readers can validate the science behind the research. The story is supported by the evidence, in this case, by the vivid quotations from the data. The quotations need to be embedded within the analytical narrative to support the scientific argument concerning the research question. The report must provide sufficient evidence of the themes within the data. In this case, the extracts (quotations) to why people remain in increasingly at-risk environmental conditions need to be reported within the themes. The extracts must be incorporated into the analytical narrative to make them clear as an illustration of the problem. Moreover, it compellingly illustrates the story the researcher is telling about the data and makes an argument in relation to the research question.

The report will vary from study to study. However, the sub-themes and themes that have been produced from this data must be identical if the same research question is examined in another environmentally at-risk place. This researcher has looked into the published thematic analysis example, particularly of the specific works that focus on social-psychological aspects of environmental issues. The thematic claim needs to be grounded but go beyond the surface of the data, meaning not just explaining the data but linking the data with the new and existing theories.

4.9 Conclusion

This chapter has explained the methodology of the thesis and the framework that is followed to examine the research question. It has been argued that the case study is the most suitable approach for producing rich, context-specific data and that semi-structured interviews are necessary to generate an original insight into the problem of non-migration. A set of structured questionnaires does not allow full freedom to express the participant's mental landscape, which might be dwelling with multiple directions of migratory behaviour. Semistructured interview questionnaires allow the researcher to follow the interview response with minimum influence while getting a good response to the prepared questionnaires. The semi-structured interview data offers a profound understanding of the behaviour of migration and non-migration. The thematic analysis will be supported with empirically grounded rules of place relations derived from the interview data and introduce the dimensions that bind the household with its place. Interviewing individuals regarding a critical case (non-migration), generating themes based on the interview data, and supporting the themes with the participants' quotes can produce significant insight regarding non-migratory decisions in the context of increasing risks from a set of slow and gradual onset disasters. Such integration has great promise for understanding household-level environment-induced risk behaviour and methodological development.

Chapter 5

Interpreting the Dimensions of Place Relations

5.1 Introduction

This second empirical chapter explores the case study data described in the methodology chapter and concerns the design and use of the semi-structured interview to build a theory grounded on relationships with a place. The semi-structured interview has been used before to investigate migratory decisions at the household level (Amit and Riss, 2013). As the theories of place partially explain attitudes and perceptions, adaptive behaviours do not match up, especially where risks and vulnerability to environmental stress are rising.

Scholars have studied the human-place relationship in urban and rural settings and found that livelihood strategy is one of the dimensions for understanding why people live where they live (Thomas, Serwicka and Swinney, 2015; McMichael and Powell, 2021). Livelihoods, in this case, means of living in a climate-induced vulnerable context, play a significant role in explaining human-place relationships (Chambers and Conway, 1991; Serrat, 2017). Aims to achieve potential livelihood outcomes, i.e., more income, managed vulnerability, food-water-health security, increased adaptive capacity, and well-being, motivate these households to remain in this place. However, research that seeks to investigate non-migratory decisions and attitudes is still rare.

This study highlights this gap in the academic literature and uses semi-structured interviews to investigate human-place relationships in an increasingly at-risk place, Kalapara in Bangladesh. The interviews conducted during data collection incorporate multidimensional relationships with the place. This way of categorising human-place relationships embraces more aspects of subjective human-place relationships. Furthermore, this chapter describes the design of human-place relationships in which each dimension has multiple components. Each component significantly contributes to

forming that particular dimension, and together, all dimensions generate a clearer picture of a human-place relationship that can better explain adaptive behaviour in stressful environmental conditions. The specific research questions addressed in this chapter are the following:

a) To what extent can human-place relationships under environmental stress be categorised, and what is the nature of their interlinked relationships with each other?
b) How are changes in the environmental risks and vulnerability overcome by social, psychological, and livelihood-related ties with the place?

As the methodological chapter argued, assessing the human-place relationship is problematic. Neither traditional qualitative nor quantitative methods can overcome the challenge of why affected people carry on living where livelihoods are pretty vulnerable to multiple hazards and when is the moment to leave. Traditional approaches are not comprehensive enough to combine or categorise complex sets of reasons. Semi-structured interviews have been used to explore risk perceptions and adaptation decisions, but interviews that seek to investigate multidimensional relationships with a place are still rare. The interview questionnaire is used as a research tool that offers multiple dimensions of place relations. This multidimensionality of place relations helps to challenge the idea of either voluntary or involuntary relationships with the place. The literature review highlighted the approaches that attempted to explore each dimension of relationships. The present study builds on this niche in the academic literature by combining and categorising the factors representing the nature of the multidimensional relationships with the place under the conditions of environmental stress.

This study's dimensions of the human-place relationship are conceptually different from Ardoin and his colleagues (2012). Because they only identified biophysical, psychological, sociocultural, and political-economic aspects as the dimensions of a sense of place. The empirical exploration of the place relation theory accommodates social, environmental, psychological, and economic drivers that influence attitudes, values, and behaviours. Ardoin and his colleague’s model is a good fit where

environmental stress is normal (Ardoin, Schuh and Gould, 2012). One of the reasons may well be that most people are usually motivated to feel positive about the place where they live and work. Thus the notion is that people would, overall, show an affective attitude where they have grown up, have strong social networks, and worked locally. The participants of this study have overall uncertainties and bad experiences, but not all have repeated dreadful experiences directly coming from extreme weather events. This is why previously mentioned theories are not comprehensive enough to consider how these multiple dimensions of bonds create voluntary and non-voluntary relationships with the place under environmental stress. Nevertheless, it is increasingly becoming accepted that migratory decisions should be understood as a combination of voluntary and non-voluntary components that interact with each other towards changes in the relationship with the place.

5.2 Data Reliability

The reliability of qualitative data is a decisive factor in a study's overall quality and credibility. Conceptualising the framework, anchoring that concept in the empirical data (interview transcripts in this study) within which the result emerges (Legewie, 2017). Bridging this gap between the concepts, qualitative data, and outcomes is the main goal of data calibration, which makes the study credible. A study with a flaw in the calibration process is bound to lack transparency. It is believed that straightforward adjustment is impossible in many qualitative studies because many concepts are descriptive rather than numeric in qualitative data. Therefore, calibration requires rules that specify a range of statements that falls into one category that can be folded into one type of membership. This study followed three simple steps in calibrating the data:

1. Developing transcription guidelines when translated from Bangla to English was challenging. There was a very little useful study on how to translate Bangla interview data without getting lost while translating it into English. The interview was transcribed in full. Then the transcribed text was re-read to ensure it represents the close proximity to what has been described in Bangla.

2. Coding the interview transcription was the second step. All interviews were grouped by livelihoods activities – fishing, farming etc. Then each interview was read and marked when talking about place relationships. Categorising by livelihoods was helpful in summarising the type of data. However, when coded, all quotes on place relations were identified based on their associations. These associations were developed as components. Each component had similarities in its subject, and these similarities emerged as clusters called nodes.

3. Conceptualisations are a crucial part of calibration, especially in qualitative study. This study considered a detailed discussion of existing theories of dimensions of place relations but remained unbiased and relied upon what emerged from the data. Therefore, the nodes were assigned based on the components of each dimension of place relation found in the data.

No particular model on the dimensions of place relation exists that fits comprehensively under the conditions of environmental stress. Therefore, the emphasis was given to how the nodes develop based on the transcription. For example, Lechowska mentioned 12 flood risk perception explanatory factors (Lechowska, 2018). However, this study conceptualises risk perceptions in four components. The approach should be understood as a way to study a phenomenon that is solely grounded on data.

The unit of enquiry for this study is the household. The principle behind human-place relationships under the conditions of environmental stress functions at the household level rather than the individual or community level has been explained in the methodology chapter. The data for this study which was collected in early 2020, suggests that all households had repeated dreadful experiences from slow and gradual disasters. The impacts of these disasters manifest through the loss and damage of a household. Moreover, the response to these impacts manifests through migration by some or all household members.

Yet, members of households can migrate and send remittances as part of livelihood diversification – what is referred to as 'stretched livelihoods' (Winkels, 2012). However, this study focuses on non-migratory decisions that are taken not by the earning members but influenced by all members. Even in the case of displacement of this nature, not just

a member but the entire household becomes displaced. Therefore, the qualitative data were collected in the context of household capacity. The data used for each respondent was based on total earning members and household income sources. Questions were asked in steps so that participants find it easy to respond whether loss and damages from that particular livelihood would have raised any desire to leave the place. Some participants could not give precise information as to the extent of the loss or damage that would influence their relationship with the place. However, responses regarding whether they wanted to migrate or not were evident and strong.

For most participants, livelihood strategies incorporate a range of different activities. For example, along with the primary livelihood sources, home gardening and household livestock play a significant role for women to make their living, providing sources of nutrition and, in some cases, income. Despite a lack of education, skills, insufficient farm size and credits, most women adopt traditional homestead vegetable cultivation and livestock farming practices. Ensuring gender-sensitive policies, i.e., the ability to speak in public, autonomy in livelihood decision-making processes, and ownership in business enterprises can enhance household in-situ adaptive capacity (Kabir, Marković and Radulović, 2019; Islam and Sharma, 2022). However, it was challenging to ensure gender equality in the data set during data collection. The challenge was overcome by hiring local women that helped optimise women's participation and data quality.

Understanding the diversity in household livelihood strategies is essential in increasing environmental stress. Households in a given community are not equally vulnerable under this condition. Reliability was ensured by selecting participants from all major livelihood categories in the study area, and questions were asked about shifting livelihoods - shifting from high environmentally dependent livelihood activity to lower environmentally dependent livelihoods under increasing environmental stress. This ability to juggle livelihood activities in response to changing environmental circumstances is an essential characteristic of livelihood strategies determining migration and non-migration decisions.

5.3 Thematic Analysis

In the next stage, thematic analysis was used as a method of data analysis to distil the main shared themes generated from the data. Traditional approaches exploring human-place relationships are not suited to simulate this non-migratory behaviour as they cannot simulate multiple factors inherent in the social, economic, and psychological aspects of those at-risk households. The following conceptual framework was created to imitate the nature of human-place relationships in the villages in Kalapara in response to the data analysis. The use of interview data and NviVo, the qualitative software, have enabled us to reach the findings of the study. For this study, each sub-components was a theme; crucially, each bunch of nodes in NviVo presented a different and plausible attitude toward non-migration decisions. All sub-components were initially categorised based on voluntary and non-voluntary non-migration decisions and then categorised based on subjective distinctiveness. Each distinctive subject was an overarching theme of place relations that comprehended the reasons for non-migration attitudes. Through top-level coding and inductive qualitative analysis, the emerged components are categorised broadly in four dimensions which represent why the households carry on living in Kalapara, Bangladesh:

a) Livelihood Opportunities
b) Place Obduracy
c) Environmental Risk Perception
d) Social-Structural Constraints

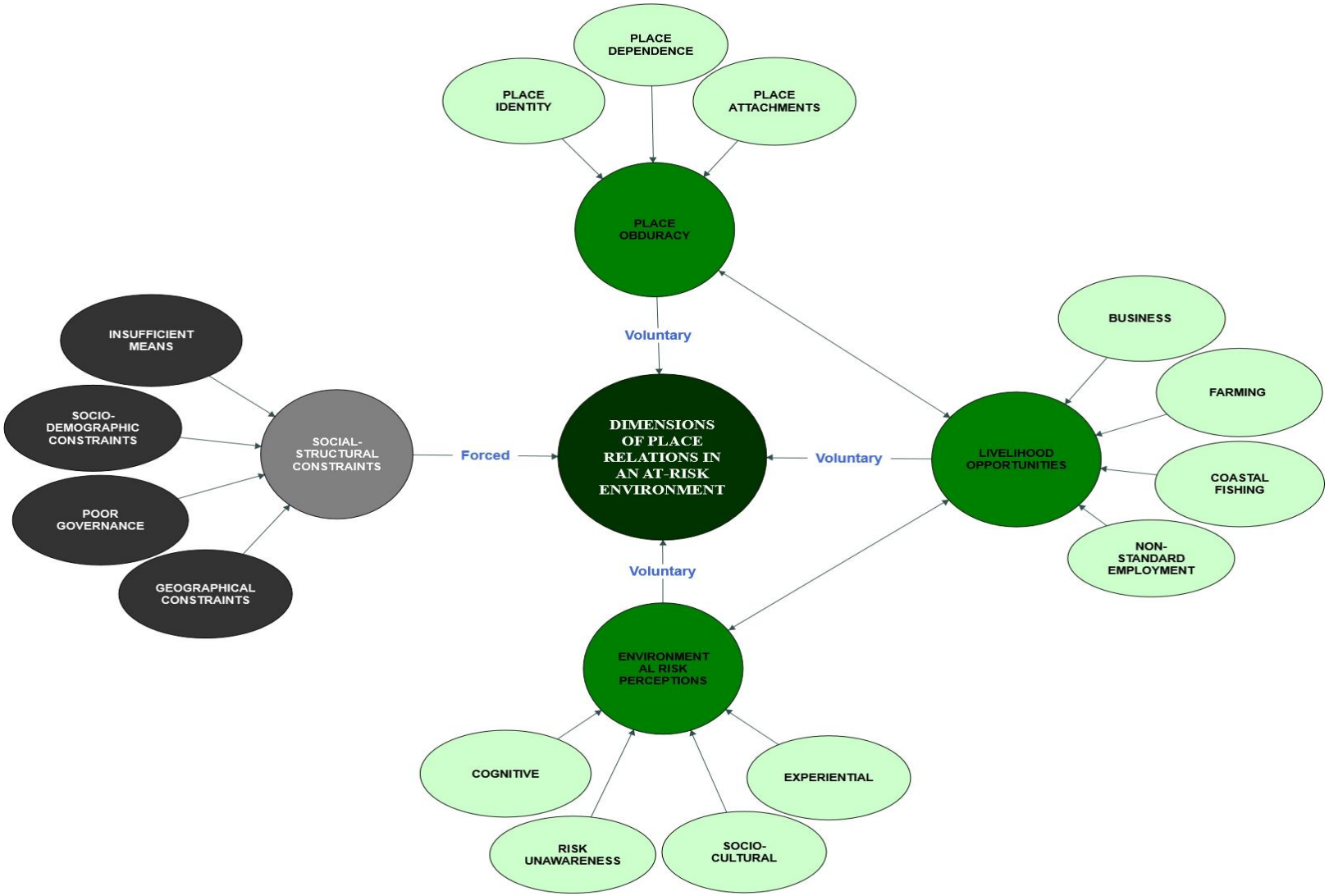

Figure 5.1: Conceptual framework showing the dimensions of place relation under increasing environmental stress

Three dimensions, livelihood strategies, place obduracy and environmental risk perceptions, represent voluntary relations with the place. What this means is that these are the dimensions that drive people to carry on living under increasing environmental stress voluntarily. On the other hand, social-structural constraints represent forced relations with the place. This dimension is for the people who are willing but unable to migrate predominantly for the reasons induced by the stressful environment. Each dimension has multiple components. The components emerged from the data. However, the study has considered existing theories on each dimension. For example, the sense of place has been studied, and three components were identified that forms one of the psychological dimensions of place. This study considers these components of sense of place and introduces place obduracy to describe psychological attachment under increasing environmental stress. Environmental risk perception is another psychological dimension with four components, and the study found a voluntary relationship with the place. Income opportunities are another dimension predominantly found in building a voluntary relationship with the place. Social-structural constraints are opposite all three of the other voluntary relationships and make the relationship dimensions complete.

The data suggest that all these voluntary dimensions are geo-specific, meaning that each subcomponent directly or indirectly references a geographical location and disaster profile. The nature of these voluntary relationships can be different in a place with normal environmental conditions. Moreover, the dimensions are interlinked with each other and establish strong relationships with the place. For example, a fisherman born and grew up in Kalapara has a specific perception of the place and the cyclone. He has directly experienced quite a few extreme weather events and has ideas about how it affects fishing livelihoods. It means the environmental risk perceptions are interlinked with livelihood opportunities and place obduracy. The nature of this interlinkage has similarities between the workers and boat owners. The similarity in this context means the level of access to wealth influences a little in the interlinking relationships.

The place obduracy is so strong that most participants have no aspiration to leave despite existing vulnerabilities. Obduracy for them remains till the existence of the land and associated identity, dependence and attachments to it. Until the land (not the home nor the livelihood opportunities) is claimed by the sea, the relationship with the place seems to remain intact. For example, even if the home is washed away during storm surges, most participants take shelter in the cyclone shelters, and once the disaster is over, they return to the same place and build their homes again. This strong sense of place obduracy over-throws the perceived environmental risks and loss and damages to their livelihoods.

The livelihood opportunities are also linked with risk perception and place obduracy. The impacts of disasters on their livelihoods limit successful resilience and make development unsustainable. However, in-house and local, minor but multiple alternative sources of livelihood contribute to mitigating the impacts. The livelihoods available for these people, in most cases, are learned from childhood. They have seen their elder family member doing it and have inherited patches of agricultural lands, boats and fishing gear. They know how to make the livelihood outcome successful, meaning where to take the crops and fish to sell. In a time of increasing loss and damage, what is required to shift their traditional livelihood is a big challenge for these people. Any new opportunity in that area adds to their existing livelihood opportunities. People find it an alternative to the existing challenges for specific livelihoods, making them less vulnerable to existing risks. New livelihood opportunities offer alternatives to existing challenges that are considered the potential for risk reduction, and consequently, the attitude to non-migration in increasing environmental stress remains the same.

In addition to these available alternatives, all perceptions, including the disaster risk, are cognitive for the participants. What it means is that these people are born and grew up under usual environmental stress, which is considered normal for that geographic area – or at least familiar - to them, disaster risk perceptions of these people are different from other areas in which disaster profile is diverse. Growing up within different norms has enabled participants to make successful livelihood outcomes from what is available

in the area despite experiencing loss and damage from disaster exposure. So people who live in increasingly environmentally at-risk areas, their perceptions of the increasing disaster risks of that certain place differ from those of people from different areas. There are cultural and affective dimensions to risk perception that mean that individual responses to risk do not always correspond with the severity of the hazard. The perceptions towards disaster risks help determine choices during livelihood shifting and non-migratory behaviour.

On the other hand, for participants who are aware of the environmental risks and their association with current livelihoods, their voluntary dimensions of place relations are supposed to be different – attitudes towards non-migration are supposed to change. Even though these participants would have social and structural constraints, which were required to overcome to enable themselves to migrate, in this context, the relationship with the place is not voluntary. Rather, they are 'trapped' due to their inability to overcome social and structural constraints that force them to be attached to the place.

Data from the study suggests that place relationships under increasing environmental stress is not just vulnerary or involuntary. Rather, it is a combination of both, associated with social, economic, psychological, political and structural circumstances that change over time. This is the result of the study and is explained through the dimensions of place relations in the following sections:

5.3.1 Livelihood Opportunities and Place Relations

Livelihood opportunities have been one of the strongest voluntary dimensions in the data explaining why these households remain in increasing at-risk conditions. In modern society, many livelihoods are not equally and directly dependent on environmental conditions. However, in an agrarian society, in this case, Kalapara in rural Bangladesh, most livelihoods have always been highly sensitive to environmental conditions. Farming, fishing, local businesses, and informal labour have always been sensitive to environmental conditions – and livelihood strategies adapt to change and, to some degree, deepen uncertain circumstances. Human-place relationships, therefore, are linked with livelihood strategies. Current livelihoods make the livelihood vulnerability profile of Kalapara high. However, this study did not measure how their

livelihoods are becoming more challenging or how to build equitable resilience in Kalapara. Rather, this section focuses on how livelihood vulnerability plays a significant role in human-place relationships.

This study found that livelihood strategies and vulnerabilities dwell together in Kalapara. On one side, environmental stress is damaging livelihoods, and successful livelihood outcomes are becoming more challenging. On the other side, governments' project to turn an environmental hotspot into a tourist hotspot creates new and more livelihood opportunities. New livelihood opportunities, better infrastructure, and communication systems are helping directly to make better livelihood outcomes. New livelihood opportunities for these at-risk people are helpful to enhance resilience, at least for the time being, because it is not clear whether tourism-based livelihoods are less or more vulnerable to traditional livelihoods.

For example, a middle-income farmer from Tolatuli described the scenario as

> *"Yes, I thought about it (migrating) earlier. I thought the price of land here had increased. So, I would get more if I sold here and bought somewhere cheaper. But I have abandoned that plan. I farm here and have some places where I have built shops and get rents from there. Things are better here now."*

A better livelihood outcome from multiple sources means enhanced adaptive capacity and more resilient communities. The question of increasing impacts from disaster risks, i.e. crops get damaged and shops remain closed during disasters, did not come up as a dominant response. Rather, new livelihood opportunities strengthen the relationship with Tolatouli.

This study picked up four major livelihoods in four communities across the coastal area. No communities were homogeneous. Each community had a mixture of these major livelihoods. One community might have more households involved in fishing. Other communities might have more households, and their main livelihood is farming. Not all fishers involved in fishing do so in the same way or are in the same economic condition. However, they all had a similar experience with disaster because the communities are geographically in the same area and share a common disaster profile. In this case, they

might be similarly exposed but not similarly sensitive or with the same levels of adaptive capacity. In the following sections, this study discusses to what extent each type of livelihood vulnerability and opportunity is influencing the relationship with Kalapara:

5.3.1.1 For Farmers (Krishok)

Farming is one of the main livelihoods in the study area. Farmer participants were primarily middle-class (Grihostha), subsistence farmers (Krishok/ Chasha), and day labourers (Krishan) on larger farms. Some farming households, considered middle class, have patches of farmland. Crops from these lands are kept for year-round household food supply, and extras are sold in the local market. Subsistence farmers own farmlands and manage crops sufficient only for their own use, without any surplus for trade. Some farmers do not have lands of their own but work in other's farmlands as and when in demand, considering themselves poor or even destitute. All farmers are rooted within their communities though this is expressed in different ways. Middle-class (Modhyabitto) farmers, who have a home, lands to feed the household year-round, and livestock, might have the assets needed to leave the area but must gamble the value of their current assets against future earnings in a new place. A fisherman works for someone else's boat, has a corner shop, and the wife has a sewing machine. They consider themselves middle class and describe uncertainties associated with migration and environmental vulnerabilities at the current place:

> *Our place of work is at sea. If we migrate to the city, we must pull the rickshaw or work in the construction industry. It is better here. If I work as a fisherman for three months, I can buy rice for the rest of the year. Everything else can be earned through the corner shop. There are good and bad, but both are here.*

Subsistence farmers have smaller asset-based and usually insufficient savings to relocate. Landless farmers have the highest levels of vulnerability, as most of their skills are specific to farm labour, and they have limited material or financial assets that would allow for voluntary, planned migration. The data also shows that not just the material

or financial assets that bound them with the land forcefully. These people voluntarily want to remain because they are more confident of getting alternative livelihoods locally. When cyclones damage crops, they have no other means of income. They then cannot move to other farms due to the regional scale of crop damage combined with a lack of means to travel to new farming areas.

Land-owning middle-class farmers are attracted to agricultural diversification, particularly saline-tolerant rice and other crops resistant to extreme weather events and/or of higher value, such as mango and coconut or cattle and poultry farming. They have strong networks of government and non-government support. However, these are not perfect solutions because sudden and gradual extreme weather events, i.e., storm surges and salinity increases, resulting in crop loss, which is linked with lowering market prices, create conditions of acute vulnerability.

A participant who identifies as a middle-class farmer also has a corner shop in Kawar Char. His family of eight has three working members. Collectively, the family has repeated experiences of crop loss, as he states:

> *"The embankment collapses easily and floods the farmland. This island is full of farmers. It is a big problem if they can't make enough money from farming. People go fishing, but it does not make enough. But if farming goes well, people can make a good profit."*

The *potential* for profit from farming remains a powerful motivating factor – given that crop loss is not limited to one specific region, agricultural vulnerability from specific weather events is not a strong enough motivator to force migration for land-owning farmers. Another useful quote from a farmer in the same community represents how farmers gamble with environmental stress,

> *"The problem is just the salinity intrusion and cyclone. Otherwise, farming is profitable. I spent four hundred thousand takas (£1000) to farm watermelon; if things survive, it can be sold for eight hundred thousand (£8,000). However, if we get caught by the flood, we lose".*

The sense of community risk is keenly felt in island communities, as all suffer simultaneously, with different sensitivity and adaptive capacities. And currently, there are possibilities to win over the disasters and make a successful livelihood outcome. New livelihood opportunities are there are more opportunities to come when the area is modernised to attract tourism. Nevertheless, the question remains how resilient these livelihood opportunities are and how much they can enhance the adaptive capacity of these communities so that they do not become 'boiling frogs' in the context of increasing environmental stresses. The boiling frog is a metaphor to represent the household's inability to perceive and unwillingness to respond to increasing environmental stress and unresistingly allowing the households to reach the limit of adaptive capacity (Davies Pamela, Francis Peter and Wyatt Tanya, 2014; Hanson-Easey et al., 2015a). In fact, suddenly put into boiling water, the frog hops right out to save itself from death. In water slowly boiled, it does not feel the deterioration of its ambient conditions and ultimately boils alive (le Ravalec, Rambaud and Blum, 2022a).

5.3.1.2 For Coastal Fishers (Jele)

The government's initiatives to ban all types of fishing during the breeding and spawning hatching season have increased catch size (Rahman et al., 2020a; Mustafa, 2020). Better-equipped boats and increased economic incentives during this season have allowed coastal fishers to catch for longer and manage their source of income more efficiently. However, benefits are not evenly distributed. As with farming, boat owners and day labourers have very different outcomes. Within our study, most of the day-labourer fishers live in government-built huts (Abasan) along the coast or on their ancestral land. Some also owned small patches of farming lands where rice and vegetables were grown, and others owned hens, goats, and cows. However, most household income stems from fishing labour. Given the fishing ban, the fishing livelihoods are seasonal. The economic support offered by the government is not a substitute for generating enough for the household. Most fishing opportunities go to physically fit men, with very few opportunities for women. Traditionally, women work as homemakers, or less commonly, as day-labourers drying fish or farm-working.

One interviewee, a male c*oastal fisherman* from Paschim Khajura who identifies as lower-middle-class, explains that for day labourers, there is increasing diversification of livelihood types and that flexibility under conditions of uncertainty is important, stating:

> *"When it (catch) was low, the fishermen had to work outside. For example, they had to work as labourers, harvesting crops on other's lands, pottery, and whatever skills they had. Whatever work they found, they did carry on. Recently, as the catch has gone up, we are better now… Here it is good for living. Because the demand for fish here is high, people here can also do other things, for example, farming, business, etc. The availability of different livelihoods helps me keep going."*

This diversification represents new income opportunities and limited local economic market diversification, which enhances livelihood outcomes and contributes to improved adaptive capacity manifested as better economic well-being (Kelly and Adger, 2000; Peña-Lévano, Taheripour and Tyner, 2019). All these people need to start a farm or business is a patch of land, a shop, capital, or credit in a land that is not far away, disaster-tolerant seeds and not at risk of salinity and are essential for farmers. Capital and credit are also essential for businesses. These alternative livelihoods would support enhancing adaptive capacity. However, it is also essential that these households are aware of their short and long-term risks so that, if required, they can take an informed decision in time.

This was also particularly acute for women. Three women in Kawar Char, an island where the government engaged in a policy initiative to relocate people to a nearby village. All work as day labourers locally. They have their huts, and two had the experience of losing family members during Cyclone Sidr. They describe their relations with Kawar char:

"There are job opportunities here. For example, Opportunities to work in fishing boats and work in the farmlands as daily labourers. Whoever has land, farm potatoes, lentils, watermelons, etc."

Women primarily work as homemakers but provide household-level adaptive capacity, often in the form of economic flexibility. By diversifying the labour types within the household, such as through day labour in fish drying or farm work, they contribute to stabilising household incomes under conditions of environmental (or economic) stress. However, not all can benefit from such diversification strategies. There is a limit to the specialised knowledge required for livelihood diversification, and not all workers can move easily between job categories. As a working-class fisherman who sells labour in someone else's boat in Kuakata Hoshen Para states:

"This is our fishing place. I was born here. Where else would I go? What will I do there? I am good at fishing. I know where to get more fish around the coasts of Kuakata. You 'don't get fish everywhere in the sea."

The opportunity for income remains a strong motivating factor for living in stressful conditions. However, the phenomenon is multidimensional and can be interpreted as place dependence and opportunities for income. The knowledge and experience about the place and limitation of the livelihood skills have become tied to specific localities, such that people become concerned that they will not be able to transition from one place to the next. The local nature of their skills and knowledge becomes a barrier to geographic mobility in the face of environmental threats, such that their livelihoods become the only opportunity for income which acts as a dominant factor in their relationship with the place they live.

5.3.1.3 For Small businesses

The economic vulnerability pattern is the same for small businesses – business owners and day labourers have very different vulnerabilities. About a quarter of interview participants owned small businesses, usually small shops on the coasts on the seaside of the embankment, and formed local markets. These shops are highly vulnerable to

storm surges, erosion, and sea-level rise. During a weather emergency, shop owners must quickly move stock to safety and remain closed for weeks until tourists return. The local council (pouroshobha) has allowed these markets but provided little support to reduce such vulnerabilities as weather and sea protection, risk assessment, or insurance to ensure safety, effective emergency response, and long-term profitability. In sustainable livelihoods terms – transforming structures and processes is essential here.

An ex-migrant in Paschim Khajura returned to the area after his contract was over. He lives in a combined family with other working members. The family owns an acre of farmland, a typical landholding and a small grocery shop in the local market. They had experienced losing family members during a cyclone in the past. The interviewee describes his relations with Paschim Khajura:

> *"I live here because there are quite a few business opportunities here. There are multiple sources of income; for example, fishing and fish-oriented businesses are also available here. These opportunities are not available in the north of Bangladesh."*

Only if the individual has the necessary resources, skills, capital or credits, and markets to make a livelihood successful is it an opportunity. In Paschim Khajura, the individual has fishing skills, and the fish is demanding in the local market. On top, he has the capital to run a shop to generate some extra income. Together, the household can make a living to sustain itself there. The availability of these livelihoods and the criteria to make a living out of them are still available for the household. Therefore, their relationship with Paschim Khajura is strong.

However, with increasing environmental risks, how long will these livelihoods be able to provide a living still full of uncertainty? What if the farmland gets flooded, what if the saline water intrudes in it, what if the tempests become more frequent and they have to keep the shop close for longer and a number of days throughout the year? Despite

multiple losses and damage experienced from extreme weather events, these households are unaware of the uncertainties associated with imminent and future environmental risks, and the availability of livelihoods is influencing the non-migration decision.

5.3.1.4 For Non-standard employment

There were quite a few participants whose primary livelihood outcome was not from farming, fishing, or small businesses throughout the year. These people lived in huts on the coast, or the government built abashon but did not want to call themselves destitute. There is no formal agency to recruit these people for daily labour, but they have strong social networks and places to show up and get hired by construction agencies and boat owners. During fishing seasons, these people get hired by fishing boat owners for a weekly fishing trip or even for the season. These people also get hired by local construction contractors to build roads and buildings. These people are in high demand in the harvesting season as well. They get hired by better farmers. They work as a handyman for local shops. There are local youths who work as guides and photographers for tourists. Bike cabbing in the local area is becoming another attractive livelihood. However, all of these new tourism-based informal employments are vulnerable to disasters. A labourer in Kuakata, usually hired by wealthy farmers, describes his livelihood vulnerability as *"If the storm hits, everything stops. No work is available. People who are daily labourers, they meant to face the problem."* It is understood that these people are at the forefront of vulnerability and at the bottom of their adaptive capacity. Still, do not have any desire to leave the place. A cleaner at the local council had to attend to work at the coast even on a stormy night. This is how he puts his attitude towards livelihood diversification in the face of livelihood vulnerability from disasters

> "*I have to go to work even if we get a high alert of a strong cyclone. If I 'don't go, they will put me absent. I am in critical condition. I have some cows. That is my hope*."

More than half of the participants have multiple sources of livelihood. Recent development initiatives have added more opportunities for income for the local communities in the area. Those who worked on farmlands, in fishing boats, or as

irregular labourers have now started working for construction companies. Tourism-based self-employment, i.e., bike cabbing, photography, and selling street foods, has created more income opportunities. We see, therefore, that even when individuals directly experience loss and trauma due to extreme weather events and other climate-induced vulnerabilities, the potential of economic profit, even under growing uncertainties, remains a powerful motivator to stay within physically and economically risky environments.

5.3.2 Place Obduracy and Place Relations

Place obduracy is a concept to describe the conditions under which the rate and scale of sociocultural and socioeconomic change lag behind due to concurrent changes in environmental stress. The concept is introduced here as one of the voluntary dimensions of place relations that help explain non-migratory behaviour under increasing environmental stress.

Place obduracy involves identity, dependency and attachments of at-risk people that facilitate voluntary psychological connections due to social, cultural and economic lag within hazardous geographical areas and their environmental components. As these connections change over time, the meanings of the place can also differ and change over time independently. Some argue place attachments and their meanings are the same. But this study found that in the case of stressful environments, for example, if the physical place is washed away by erosion or even flooded, the meaning of that place to someone affected changes, but the overall attachment does not change dramatically. Therefore, this study argues that the two concepts are empirically different because the sensitivity towards disasters may change the meaning of the place temporarily or even permanently, but emotional attachments remain intact. During the flood, farmlands get flooded, and crops are damaged, but the land itself is there and 'people's emotional attachment to that piece of land remains the same.

Because not just the opportunities of income but also the social and environmental values that keep people at risk in a stressful environment. Despite insecure livelihoods

and exposure to risks, people value their socio-psychological bonds with where they are born, grow up, work, and live and where their social relations function. These people, like people who live in natural environmental conditions, have a high level of satisfaction and a tendency to stay where they feel comfortable and safe (Mulvaney, Merril and Mazzotta, 2020). Sense of place is usually discussed in terms of place dependence, place identity, and place attachment, as presented in Figure 5.2.

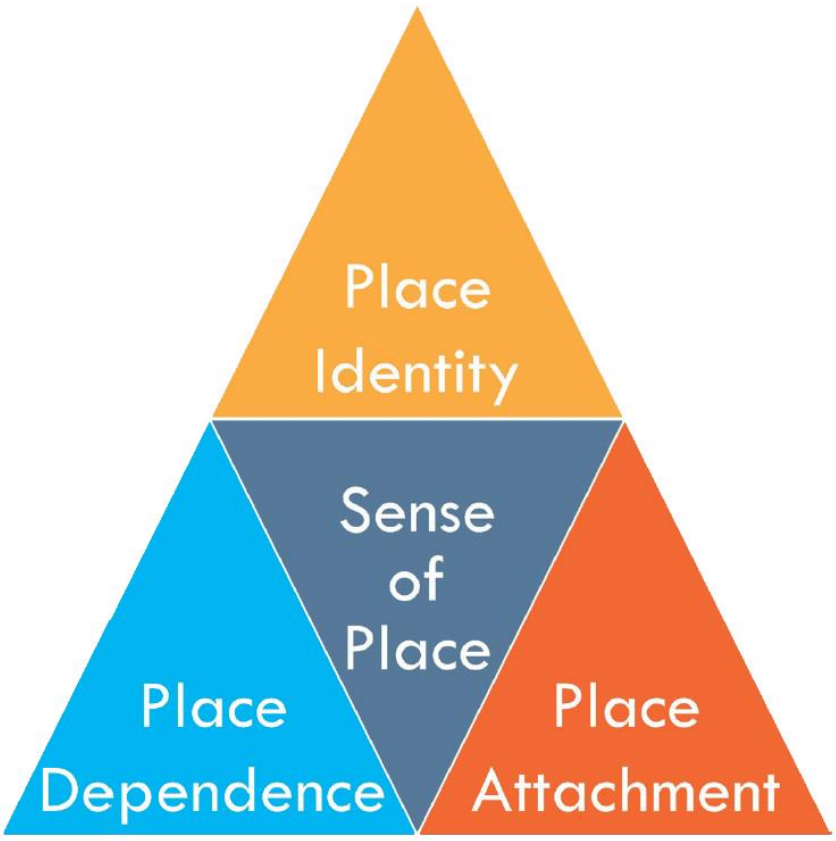

Figure 5.2: Components of Sense of Place by Mulvaney et al. 2020.

Using these components, place obduracy discusses how despite the experience of having lost crops, farmlands, livestock, and even members of the family due to extreme weather events, these sense of identity, dependence, and attachment remain strong, which means perception towards the actual risk does not increase accordingly (Brody, Samuel D., Zahran, S., Vedlitz, A., Grover, 2008; De Dominicis et al., 2015; Bonaiuto et al., 2016; Guillard, Navarro and Fleury-Bahi, 2019). The relation between place and increasing risks gets mediated by other dimensions, for example, livelihood

opportunities that keep the perceived risk at the same level. This study finds that more than half of the participants mention at least one of the components of place obduracy to describe their non-migratory behaviour of staying in increasingly stressful environmental conditions.

To explain these relationships, we draw upon the components of the sense of place (Mulvaney, Merril and Mazzotta, 2020) while adding *place obduracy* as another critical dimension of place relations, based upon emergent perspectives from interviewees (as described below):

5.3.2.1 Place Identity

Place identity is largely related to emotional bonds where an individual feels where he or she belongs and is part of that specific community. Locality, culture, language, and kinship make an individual feel at home. This bond intensifies the sense of community. A farmer built his hut on a patch of land allocated by the government in Kawar Char. He and his son work as daily labourers, go fishing in their spare time, and sell in the local market.

The farmer considers his household poor and describes his experience of living there as "*no limits of disasters here*". However, he identifies the place he lives in as "*We leave our homes during disasters and go to the cyclone shelter. When the disaster is gone, we come back home and start all over again.*" The participant *added, "Brother, we cannot go far. Who is going to look after my children? Where will we go? My birthplace is here. My father and my grandfather were born here."*

In the context of rural Bangladesh, children grow up within a combined family environment and have a strong sense of identity. Unlike urban settings, most of the time, cousins, uncles, aunts, and aunties live close to the same community, and the sense of family and family members is broader and stronger compared to urban settings. People know more about members of their community and beyond. They have common livelihoods, and the livelihoods function in the same place. These people are affected similarly by the same environmental stress. And because of having a broader space to exchange livelihood vulnerabilities and worries, adaptive decisions are also shared

among the community members. This mean human-human and human-environmental interactions are rooted in the same place and form a strong identity. People feel a part of it. If they go to a new place, they will likely lose the feeling of being at home and worry that their children's future will likely be at risk. This sense of emotional identity, thinking of being a part of the community, explains how strong his relationship with the place is and his decisions to carry on living despite increasingly stressful conditions.

5.3.2.2 Place Dependence

Place dependence reflects the importance of a place in providing features and conditions that support specific livelihood goals, i.e. fertile farmlands, availability of fish in the sea, demands of labourers, etc. Even if these physical characteristics of a place become stressful and make it life-threatening and livelihood vulnerable, the dependency does not change at the same speed.

For example, a fisherman from the case study of this research considers himself poor and lives in abashon. The government-built shelter in Khajura describes his dependency as

> *"Because we 'don't have any land, either to farm or to live. We could not send our children to school. I have always been poor. The only work I have learned is fishing. We all are fishermen here."*

Participant like this, who has only known fishing, never had access to formal education or support to adopt alternative skills. Lack of means adds to his dependency on his livelihood limitations which is nothing but to work as a fisherman in someone 'else's boat. It is difficult for them to think of picking up new skills or moving away somewhere safer. Place dependence for farmers is also similar. For a participant who has grown up in a rural area and only knows to farm, it is difficult for him or her to find an income and live in a city. Place dependency is also crucial for females in rural areas.

Livelihood options are also rooted in a place's society and culture. Most women in the studied communities usually work at home. They also engage in drying fish and selling goods in local markets. These females are responsible for gardening and raising livestock at home. On the one side, these are crucial support to regain the coping

capacity after environmental shocks. These livelihoods are also dependent on a particular place where females can make a successful livelihood outcome. It means that place dependency is linked with skills and resources available in the area. If the resources (i.e. home gardens and livestock shelters remain flooded or get damaged) change over a period, it creates uncertainty and fear.

An initial approach to this change is to initiate climate-smart agriculture and diversify the livelihoods staying in there. Some Rakhine women have been interviewed in Gora Amkhola Para whose other family members work in fishing boats. They have pig farms and also earn from tailoring at home. Farming pigs and fishing give higher income, but tailoring is more viable for the participants, and one of the reasons for taking tailoring is that she can do this all year round. Increasing environmental stress is likely to make these livelihoods more challenging. More cyclones mean more days away from the sea and without work – staying at home. On the other hand, if these communities are displaced to an abashon or slums in a nearby city, fishing and farming skills won't help to settle there. Place dependency, being able to make a living with the skills they have, is a strong factor in why they are carried on living where they are.

5.3.2.3 Place Attachment

Attachment to a place is a component of the sense of place, a dimension of place relations. The component captures the emotional bond with a place or how important a place is to someone beyond their identity and dependence. Even in the context of the at-risk environment, the place where these people live is still not judged by the degree of liking compared to somewhere environmentally safer. Rather the emotional bonds take over the actual risk and experience of disaster impacts, and the relationships with the place remain the same.

A middle-class Rakhine farmer has multiple small patches of farmlands and a family of five lives in Dariaramkhola Para. The household has multiple experiences of crop loss due to flooding and cyclones. He explains the emotional bonds with the place he lives *"Where would you go leaving this place? I was born and grew up here. My ancestors have lived here. If we go somewhere, it 'won't be any easier for us."* A daily labourer considers himself poor, has no farmlands, and lives in their ancestral home with three

members. He works for someone else's farmlands. If not, goes fishing in someone 'else's boat. *"I want to live here with my family. If I want to leave, I probably can. But I do not want to leave."*

Both of these participants have different material assets but a similar experience of living in stressful environmental conditions. However, both have strong emotional attachments to the place, which mediate their exposure and vulnerabilities. And yet to influence the relationship with the place. In a similar context, a Rakhine female used to weave cloths, farm bamboo, and paddies. Strong winds hit and rip off the roots of bamboo. But when it comes to migration, the response is, "when a storm hits, crops are damaged, then I think of leaving. When the disaster goes, then (…laugh)." Earlier, to make this comment, the participant described her place relation with Diaramkhola Para as "this is my birthplace. It is quite peaceful to live here. When a flood hits, then we seek to go somewhere safe. Everything else is good." The emotional attachment to "birthplace" (Bhitey) is quite strong in rural settings, and environmental stress, except erosion, wash it away; however, place relations remain strong.

Attempts have been made to draw the migratory behaviour of the people at risk. This study has found how the components of place obduracy are linked to non-migration behaviour. The sense of place in rural Bangladesh is unique and different from its urban settings. The explored cases for this study highlight that place obduracy – attachment, dependence and identity, do not change even after experiencing repeated disastrous loss of lives and livelihoods.

This study also found that in the case of these coastal communities, the place obduracy is similar for the middle class and the poor. It is difficult to distinguish each component of the place obduracy. Because when participants are explaining the meaning of the place and their association with it, they often combine psychological attachments and dependency on the place. These people value these components of place obduracy in their life, which keep the non-migratory behaviour unchanged. Awareness about the imminent risks and their impacts on livelihoods, new skills, and income opportunities may influence this existing place's obduracy and can eventually influence the attitude towards human-place relations.

5.3.3 Risk Perceptions and Place Relations

Among the three voluntary dimensions with the place, risk perceptions generally explain the perception of the probability and magnitude of adverse effects (Gough, 1990). As risk is built on the probability of happening of a disastrous event (hazard), risk perception depends on how human values impact their lives, environment, and livelihoods. This is where many different kinds of vulnerabilities, exposures, probability of frequency, and magnitude of disasters exist as elements of risk perception. Lechowska (2018) has classified the components of risk perception by their nature. And Satter (2019), with his colleagues, has also identified the components of risk perception and their influences. The Climate Change Risk Perception Model (CCRPM) suggests that public perception of risk towards climate change is a function of *cognitive factors* (i.e. knowledge about climate change), *experiential factors* (i.e. affect and personal experience with extreme weather events), *sociocultural factors* (i.e. social norms and values) and *demographic factors* (i.e. age, gender, income, and education level) (Elshirbiny and Abrahamse, 2020). However, these authors did not address the actual risks enough from the perspective of the human-place relationship.

This study found that the subjective appraisal of risks influences the relationship with place. These subjective perceptions are embedded in societal norms, value systems, and cultural idiosyncrasies (Renn and Rohrmann, 2000; Lee et al., 2015). However, judgments and evaluations of the subjective aspects of risks play an essential role in determining the relationship with place. The following aspects of risk perception have emerged from the data for this study. These aspects are categorised based on the participant's subjectivity and how they are associated with the place.

5.3.3.1 Cognitive Limitations: Decision-making is influenced by the experience gained from the impacts of the hazards. People living under increasing environmental stress face complexity related to planning, decision-making, and successfully coping with this condition (Kipling et al., 2019). This study found that the people in Kalapara have repeated experiences of facing multiple hazards, i.e. cyclones, storm surges, salinity, and coastal erosions. However, most of these people are not worried, and their direct experiences do not change this perception of the risks. One of the major causes

of their perceived risk unchanged is their cognitive limitation. This limitation can be explained through lived experience in this condition. Because people living in that condition for a long period of their life get used to the impacts of disasters. In a case from this study, a fisherman who was born and grew up in Kawar char, and works on someone else's boat explained

> *"There is no limit of disasters here, one or the other, every year. But, we leave our homes and go to the cyclone shelter. When the disaster is gone, we come back home and start all over again."*

Another example from a subsistence farmer and fisherman who lived throughout his life in Kolatoli says, "*No. There is nothing much. There are a few problems during the rainy season. There are no fish in the winter. We get fish during the rainy season."* This limited capacity of cognition manifests as "nothing much" and creates complexity in assessing actual risks. These cognitive limitations challenge the ability to make climate-intelligent choices about disaster risks and inspire the participants to explore options, whether to carry on living or look for a safer place.

Another explanation of this cognitive limitation is that it is not that the farmers, fishermen, and small businessmen in the coastal areas are not worried at all. However, their worries win over the facts, reasons, and objectivity of the risks that they are in. Wachinger et al. (2013) have mentioned three psychological reasons why people at risk do not take mitigating actions: a) people prefer the advantages of living near a river or a coastal area to the environmental risk it involves, b) people pass the responsibilities of their actions and uncertainties to someone else, i.e. governments or God, c) lack of actions stems from minor economic and personal resources. For example, a better-income subsistence farmer also fishes on someone else's boat and perceives risks for his farm and house as disaster impacts but cannot establish the association between the rise in environmental stress and their vulnerability over time.

> *"If Allah wants to keep someone alive, who can kill? He has created us. He is the one who will look after us. This is why we stay here confidently. The environment is good here. I have not thought of going anywhere. Rich people think of buying land in safer places. Not people like us."*

The participant has lived in at-risk conditions throughout his life, experienced crop damage, and observed fishermen lose their lives during the cyclone. However, this fear of losing crops and life has been passed on to Allah due to cognitive limitations. He recognises some places are safer, but they are beyond his reach. Lack of resources can be one of the reasons that this participant is overlooking getting another home in a safer place and prefers the advantages of available livelihoods around his known area, even though the place is at risk. The statement speaks of the sense of the social structure of this individual and the ability of the "rich people" to diversify adaptive behaviour. The statement supports that fatalism (Jahan, Mamun-ur-Rashid and Wahab, 2015) or belief in God is part of accepting his social position and hardships as well as his perception of the risks.

Cognitive limitations will likely change if people at risk meet with trustable, understandable scientific information. Once people at risk get to know a suitable livelihood skill is available for him or them and how it makes a better livelihood outcome, the potential for considering exploring options of adaptation becomes a reality. A trainee local doctor also has a business put his interests as

> "I*f the government would test the soil and give us some information about what type of crop will be good here, we would consider their recommendation. We 'don't know what type of fruits or crops grow in saline soil. So that would help*."

If this participant gets information about increasing livelihood outcomes, his perception of salinity risk will likely change. The risk perception towards salinity can be one of the influential factors in taking adaptive decisions of whether to sink into impoverishment or leave the place. If information about a safer place is reached from a trusted source, his perception of the risks at the current place will likely change.

5.3.3.2 Risk awareness:

The data sought to understand that climate change awareness is imperative in forming risk perceptions. Most participants were less likely to be aware of the term climate change or Jolobayu Poribartan. Most of them were experienced and concerned about. So, the awareness of climate change does not exist the way we usually get to see it in western societies. Participants in Kalapara are very reluctant about the risks and possibly cannot interpret the effect of climate catastrophe on present and future generations. They are not aware of personal roles and responsibilities to minimise sensitivity. This study found that the risk of disaster-induced loss and damage is passed onto God's will.

A labourer in farmlands and fishing boats in Kolatoli describes himself as poor. He describes his (un)awareness of the risks of erosion as:

> *"If the embankment collapse, then we are finished. When the storm hits, everybody runs. If we die, we die sitting at home. Things get stolen. That is why I stayed at home during Bulbul. If Allah wishes to keep us alive, he won't kill us. If he wants to kill, it won't take any time."*

Risk perception without awareness about climate change creates biased explanations (Merikle, Smilek and Eastwood, 2001) of the vulnerabilities. These people have very little formal education and little media access. Unlike others in Bangladesh, these participants have very little idea of the anthropogenic aspects of climate change (Biswas et al., 2021). Understanding the effects of climate change on health, well-being, and livelihoods facilitate risk perception, behavioural change and societal support (Lee et al., 2015b). But, there is very little about climate change in the local media. Preventing loss and damage requires understanding who is at risk and why and options for intervention. The increasing frequency of slow and gradual environmental stress across Kalapara is a reality. However, most people are not aware enough to prepare to protect their lives and livelihoods. The absence of awareness about risks made them susceptible to migratory decisions, thus, volunteering to take non-migration decisions.

Lack of awareness is a significant barrier to minimising the actual and perceived risks. Our results point to opportunities for knowledge building and engagement on vulnerability awareness and adaptation that can be applied in Kalapara and other areas to enhance adaptive capacity.

5.3.3.3 Experiential knowledge:

Risk perception is also strengthened or weakened by the indirect experiences of individuals. These indirect experiences are developed from communication networks through media reports and personal interactions with other people (Wachinger et al., 2013). Experience of being in an at-risk place differs from any household in low at-risk areas. The sources of livelihood reflect the probability of how much damage a hazard can cause. A case from this study explains how disaster experience frames risk perceptions

> *"It is harder for the people who live very close to the sea. The cyclone hits those whose houses are weak. People who had strong houses were safe from the cyclone. It hit our farmland but did not damage much."*

This participant is living a mile or two within the embankment and has a brick-built home of his own. Experience of having an entire home and affordable damage to his crops after cyclones have made him confident as he lives in a safer location. Another participant from Kolatoli, a bit closer to the sea, puts his experience of living in an at-risk area as

> "*The cyclone Bulbul caused little damage to our home. That is it. Last year my home got demolished. I did not get any help*."

A study also suggests that people living in the highest-risk areas with higher disaster experiences rarely take measures voluntarily to reduce the impacts (Kunreuther, 1996; Kunreuther, Slovic and Olson, 2014). This susceptibility results in catastrophic occurrences. This susceptibility towards risks explains an underlying dimension of why the relationships with the place are not changing. Access to scientific information may change this perception and bridge the gap between actual and perceived risks.

5.3.3.4 Socio-cultural

Cultural and social characteristics play a significant role in forming perceptions. Social networks, cultural norms, and beliefs directly affect how individuals and communities perceive the risks of disasters. These perceptions can be different from different ethnic and religious backgrounds. Many social and cultural institutions, families, friends, and colleagues influence the mental landscape of individuals where the perception of the intensity, how harmful it is going to be, or anything that can be done about a disaster is determined. One of the cases from this study can be presented here, which explains how the context of an individual forms his perception

> *"Yes, we want to raise her (daughter) here because this is her ancestral land too. Rest is the will of Allah. If the government can keep the embankment secure, everybody will be here to able to live peacefully."*

The statement is about reducing structural vulnerability and being able to live peacefully. The statement can be interpreted as the participants' sociocultural context behind risk perceptions. Additionally, some religious groups perceive disasters as an act of God and have very little control over the impacts. This study has found that more than half of the participants mentioned disasters as an act of God, and adaptive capacity is at God's hands, too. Risk perceptions, therefore, are rooted in the social and cultural context. These God-controlled perspectives influence social institutions such as local authorities, educational institutions, and religious institutions, and therefore, adaptive actions are also influenced because of these perspectives. However, hands-on disaster experiences and sociocultural institutions are taking scientific information more seriously and have successfully influenced perceptions of risks. In the coastal context of Bangladesh, where environmental risks are at the top, affected people recognise the crucial importance of relevant protection measures, and their perception of the risks is deeply embedded in the unique context of the place.

Risks experienced now by these households are very much the outcomes of the actions and decisions of the past. These households are locked into specific ways of being, doing and thinking, and breaking out of those patterns is challenging. For example,

when the following flood warning is issued, households, including flood management authorities, deal with it as if it will probably be similar to the last one. Of course, this one was even more severe. Moreover, they put affected households at risk by assuming it would be like it was in the past.

These households have created a world with vulnerabilities and levels of risks, and they see when there are failures. However, they tend not to have a sense of who might be the most impacted, who are already prone, who is marginalised, and if they fall into those factors of ethnicity, gender, etc., that shape their vulnerabilities.

These households are also seeing new risks and impacts emerging that create new levels of vulnerability. And it is not just the poor who are impacted. The middle class is also impacted. It is essential to look at both dimensions of vulnerability and how systems create these risk elements prior to the disaster events and responses to that particular event. It is pretty challenging to determine what is an acceptable level of risk and an acceptable level of impact. Of course, this social production of risks is heavily politicised, and different authorities would assess and manage it according to their own interests. And the people are likely to be in a circumstance where it becomes an accepted discourse that the authorities aren't able to protect everybody. And in order to save some, they have to sacrifice others.

How much these households can learn from the history of risks (experience of facing disasters, in this case) and how much they can re-think as they go into the future depend on what and how they are getting information about risks and responses. Because these households are in a different world, a different world means that most of these people have been born, grown up, worked and lived here—the very nature of the risks and the reasons that cause the risk are shaped over time.

5.3.4 Social-Structural Constraints

The scenario of the trapped population challenges common assumptions about environmental migration. Empirical studies have found that environmental migration does not always sink with changes in environmental factors, i.e. temperature change or

changes in the disaster profile of a place (Foresight, 2011; Logan, Issar and Xu, 2016; Ayeb-Karlsson, Smith and Kniveton, 2018). Most studies suggest that many people, especially those already drowned in severe poverty, cannot manage the money, the networks, and the information to make a successful relocation. However, this study found that the process through which the 'trapped 'condition' develops is neither just financial poverty nor involuntary, nor all the influences are climatic. It is rather a combination of slow and multidimensional economic, social, political, and health factors, not all, but most of which are directly and indirectly influenced by slow as well as fast onset environmental drivers. Most participants did not mention that they were 'trapped' or 'unable to leave'. However, in response to the question about their choice or inability to stay in stressful conditions, this study categorised the following themes which represent their involuntary relationships with the place:

5.3.4.1 Insufficient Means

Most studies acknowledge that financial constraints are the primary factor for non-migration (Zickgraf, 2019). The financial constraints and uncertainty associated with being able to feed the family play a significant part when thinking of relocating a household to a safer place. A souvenir shopkeeper at the coast of Kauata Bazar considers himself poor and has four other members in his household. When a cyclone hits, it is weeks before he can open his shop again. He has thought of doing business at some other place. He explains his trapped condition due to insufficient means:

> *"I have to have money to think that way (moving to a safer place). I 'can't afford that. So, I keep them in me."*

More frequent extreme weather events make livelihoods, i.e. souvenir shops, and coastal fishing, closed for a prolonged period. During this period, people like this participant have small social networks and very little access to formal loans. For example, in the case of a fisherman who works on someone else's boat, the only way for him to go by during this period is to go to the local money lenders, usually the boat owner, with an agreement to work in their boat for fishing. This indebted condition from a boat owner makes the fisherman bound to work only in his boat without choice. Because of this indentured slavery, the fisherman cannot save anything to start a safer

livelihood or migrate somewhere safer. Neither might he have other skills apart from working in a fishing boat. These significant human and financial vulnerability constraints have made household migration a nonviable option for this participant; therefore, the thought has been kept in mind only. These insufficient means are reducing adaptive capacity, and the participant is being forced to stay living in areas like Kuakata, which is exposed to multiple hazards.

5.3.4.2 Socio-demographic Constraints

Livelihood options depend on the available social and demographic context in which people live. The social capitals of individuals help to determine what option they have in the face of disasters and migratory decisions. Moreover, the uncertainty associated with building a successful social network in a new place is quite challenging, especially in rural and urban settings.

A daily labourer has a family of four in Kolatoli, explaining the uncertainties of social capital that are influencing being trapped in the place

> *"When a cyclone hits, everything stops. No work is available. People who are daily labourers they meant to suffer."* These sufferings have multiple faces because *"people live on dreams and hope. But, a labourer can't think of becoming a big businessman tomorrow."*

There are risks of shifting one livelihood resource to another. He adds,

> "*Let's say I go somewhere new. I am not known to anybody there. I will have to work to live there. It's not like that when I go somewhere and buy a business. On the other hand, everybody has known me since I was a child. Everybody calls me if they need someone to work. In a new place, nobody will call me for work. I will have to search and get one. And that will happen once you can reach there. Here, I am sitting at home. Someone from the neighbour's house comes and asks to work for them."*

This strong social capital is a major factor in finding employment or having a successful livelihood outcome. In the context of Bangladesh, it is crucial to have the strong social

capital to get any job, either in rural or urban areas. And these people at risk have strong social capitals where they have been throughout their life. So households at risk are more likely to use these strong social capitals to build equitable resilience (Matin, Forrester and Ensor, 2018) rather than thinking of leaving somewhere with zero social capital.

The livelihood strategies households decide to pursue are usually based on many, but the gender and physical conditions of the members of the households also play a significant role. The poor physical condition of a member can limit livelihood outcomes and increase overall vulnerability. Women in the society of Kalapara face tremendous challenges in accessing higher education, obtaining a job, and having the authority to make decisions.

Another daily labourer in Kolatoli has four members in his family and considers himself poor. He has seen how cyclones, storm surges, and erosion have changed the landscapes and livelihood resources. Huts have been blown away, and crops have been damaged many times, but the man has no plan of leaving his place. He explains physical and economic constraints for livelihood diversification and uses social relationships as a survival strategy

> *"I have already grown old. But my sons and I are in a combined family. My son is a priest here in Kuakata. What will he do outside? Migration needs money. We don't have that money."*

For this labourer, older in age, less demanding skills of family members, and financial scarcity are limiting livelihood diversification and, therefore, increasing the vulnerability of this participant. Age, gender, and disability in at-risk households can reduce coping capacities and create trapped conditions within an environmentally stressful place.

5.3.4.3 Poor Governance

It is not just a matter of assets but transforming structures and processes to make a successful livelihood outcome. How an individual can turn those assets into what he or she needs depends on the social and political institutions in which he or she is. Poor

governance, from central to local, can be one of the reasons for poor risk management and maladaptation. At individual, household, or community levels, vulnerability and adaptive capacity depend largely on livelihood options that the administrations of the society manage. When social, political, and economic institutions do not have such strategies, poor governance adds more to the vulnerabilities of life and livelihoods of their citizens. A subsistence rice farmer in Tolatoli has few pieces of land and considers himself poor. The participant describes the government's initiatives to reduce structural vulnerability as

> *"This is a disaster-prone region. We need more cyclone shelter. The erosion has gone down due to government initiatives. Salinity can't be controlled by the government. This is the wish of Allah. We get only one crop throughout the year because of salinity. The new embankment might help us grow a second one."*

Building embankments and residential homes for the destitute (abashon/ashryan) and other economic initiatives, awareness about the risks, and risk-based resilience initiatives are at very basic levels. Poor governance and corruption limit the potential of adaptive capacity. The same participant describes corruption as

> *"Increased land price has created a lot of problems for us. Even if you have records in the land registry, you can't have the land. The politically powerful people in society are taking control of the land by producing false documents and using local goons."*

Most farmers, fishers, and small business people are at the bottom level of the political power ladder and are usually the victims. Poor governance and corruption make these poor people more vulnerable and, reduce adaptive capacity in the face of disasters, and create trapped conditions a forced relationship with the place.

5.3.4.4 Geographical Constraints

Geographical location has long been recognised as a significant factor in shaping patterns of human-place relationships. Access to natural resources and opportunities for a better livelihood (despite the fact that these places also tend to be prone to cyclones

and storm surges) remains a powerful motivation for non-migration. Livelihood opportunities and geographical constraints are not the same. Livelihood opportunities voluntarily motivate people to non-migration. On the other hand, geographical constraints are when a particular livelihood is rooted in a particular place, and people can only make their living through that livelihood. For example, some fishermen only know fishing, and more-stronger cyclones make fishing more challenging, but the fishermen have no alternative skills to make a living; therefore, they have to go fishing. In the absence of preventative and supportive measures, households try to cope with the crisis by compromising the potential for safety, security, and long-term well-being goals.

A smallholding farmer farms chillies, butternuts, and bitter vegetables in Tolatuli. With one decisive blow of the wind, all of these are gone. Last year the farmer lost his chill farms entirely, along with thousands of other farmers. In response to why he is still living there, he responds as

> *"Neither I know any business nor can get a job. I could not study. My parents died when I was young. I had to work to keep the family going. In order to survive, what other work can we do? If we want to live, we have to work (in my farmlands)."*

These limitations in education, skills, and responsibilities keep this participant as a small farmer. He has a piece of land, and that is all he has. Moreover, the land is affected by multiple hazards. A farmer with similar assets in a different location will likely have a better livelihood outcome. However, because of the location, the location is at high risk of multiple hazards, causing impoverishment and a forced relationship with the place.

5.4 Conclusion

From the interview data, all involuntary dimensions of place relations were categorised into four sub-categories: insufficient means, socio-demographic constraints, poor governance, and geographical constraints under structural constraints. The components of social-structural constraints are unique in nature compared to the other three dimensions of place relations. All other three are creating a voluntary relationship with the place. However, social-structural constraints are creating a forced relationship where groups of individuals desire to migrate to a less stressful environment but cannot make that happen due to a lack of constraints. Hence, they stay wherever they are, doing whatever they do, even when their livelihood conditions decline. From the data, it can be argued that the participants mentioned that they desire to migrate to a less environmentally stressful place. The same participants mention social and psychological attachments that are not involuntary.

Some of these households have seen how social and structural systems can fail in an unexpected way, and fairly small components of these complex systems have failed in Kalapara. One part of these complex systems is that when they fail, they have reverberation, cascading effects in unexpected ways across people and places and scales that have perhaps not been experienced or dealt with previously.

There is a possibility to re-imagine the future, perhaps drawing from the past. However, that future (climate-centric development) is also quite different from where these households are. These households in Kalapara are increasingly dependent on systems that are no longer local but increasingly global, increasingly at a level of complexity over which it is challenging for these households as individuals or even communities, cities and countries to have much control.

In this context of Kalapara, experimental governance, institutions that foster learning by monitoring, can be a much more appropriate way of intervening in complex and uncertain environmental risks (Wolfe, 2018; Grönholm, 2022). In experimental governance, the role of governance arises from the insight of policy recommendations and a wide range of social and economic actors, including regional and local governments, the private sector, voluntary, business and non-profit organisations self-

monitor and learn from past successes and failures. It resonates greatly with how the climate and social-ecological systems literature deal with uncertainty and address risks, vulnerability, and adaptive capacity as hinging on social learning (Goldstein, 2012). Experimentalist approach to the governments' decision-making, learning from past experience, but also being able to anticipate things that we have never experienced before and might manifest differently. Perhaps the way risks are unfolding now can incentivise neoliberal responses where migration and non-migration decisions are individual and privatised rather than public ones.

All of these four dimensions of place relations, how they function, and their uses will be discussed in the next chapter. The main focus will be to explore how these interview data and different dimensions of place relation can contribute to adding light to the migration process, i.e. the journey from non-migration to migration. The chapter will discuss how new climate-smart livelihood opportunities can strengthen and weaken place relations. The chapter will also focus on how awareness about the risks contributes to minimising the gap between perceived and actual risks and taking an intelligent decision as to the stress and their impacts increase. The chapter will also discuss how psychological attachments and social networks can significantly build place relations. There will be a section highlighting how climate and people-cantered policies can reduce social-structural constraints and gain control of overall vulnerabilities to ensure the enhanced adaptive capacity of retreat as and when required.

Chapter 6

Discussion

6.1 Introduction

In the earlier chapter, evidence has been provided on how the dimensions of place relations and their components simultaneously create a complex combination of voluntary and non-voluntary aspirations towards migration and non-migration. We need to pay closer attention to these dimensions of place relations and examine why and how people value them in order to better comprehend adaptive capacity and migration decision-making processes for households and individuals in locations that are increasingly at risk. When we develop national and local indicators for Sustainable Development Goals (SDG), economic development and informed adaptation, policymakers need to consider that these are interrelated, temporal, and have a time limit, after which households are highly at-risk of being displaced. For example, a development policy for an increasingly at-risk community needs to have necessary adaptation measures as the risk increases, and the development policy also should have plans regarding what to do if the community exceeds its adaptive capacity at any point.

This chapter begins with the displacement scenario in Bangladesh and highlights how this research contributes to the conceptual global policy debates linking disaster risk reduction, enhancing adaptive capacity and managing forced migration. How the components of place relations change in an increasing at-risk community over time can help better understand the temporality of the adaptation and adaptive capacity issues. This chapter provides current disaster risk reduction, adaptation and forced migration policies in Bangladesh at national and local scales. The chapter then critically analyses the following four policy aspects - local economic development, preventing and protecting disaster-induced displacement, informed adaptation, and disaster-induced

cross-border displacement and highlights how dimensions of place relations can help build these targeted policies, which might require the climate hotspots in Bangladesh.

6.2 Most Recent Displacement Scenario in Bangladesh:

Bangladesh is a low-lying delta where tropical cyclones hit the shore of the Bay of Bengal and inundate coastal areas. During the late monsoon, excessive water comes from the Ganga-Brahmaputra delta and causes floods and erosion in the north. High population density, slow socio-economic development, and poor administration have already resulted in millions of displacements nationwide. Disasters used to cause hundreds of thousands of death in the past, but Bangladesh began to invest heavily in emergency response, i.e., early warning systems, community engagement in evacuation and managing cyclone shelters. The successful initiatives resulted in a significant drop in the death toll from cyclones compared to the 1990s, when death tolls used to go as high as 135,000 (in 1991). However, in recent years there has been an increase in the loss and damage caused by catastrophic disasters and the displacement trend, as illustrated in Figure 6.1.

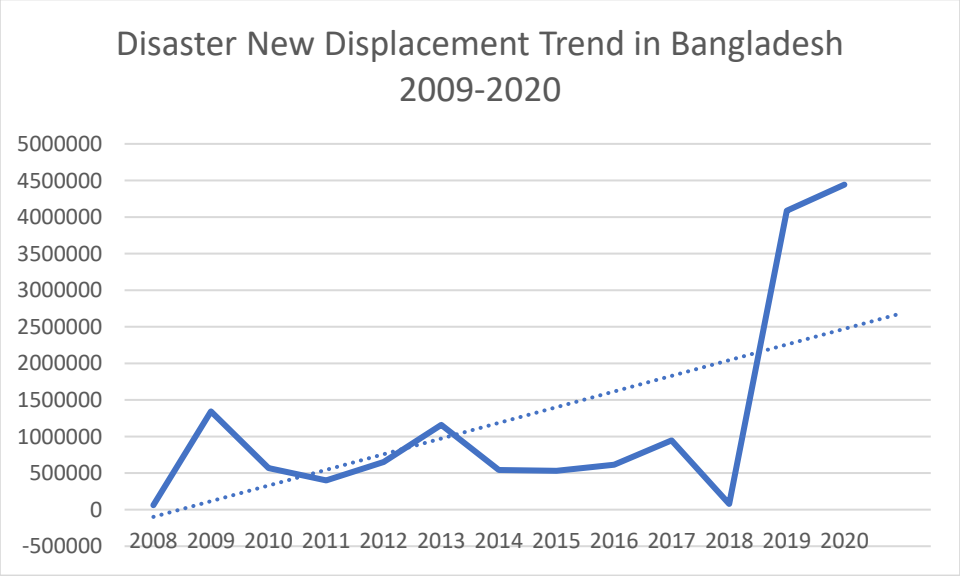

Figure 6.1 Disaster New Displacement Trend in Bangladesh. Source (IMDC, 2021)

There were 4.4 million new disaster-induced displacements in 2020, which made disasters the primary driver of displacement in Bangladesh for that year. During Cyclone Amphan that year, 2.5 million people had to evacuate their homes temporarily and take refuge for weeks in the cyclone shelters. That year's monsoon floods were the worst in decades and resulted in approximately another 1.9 million displacements in Chittagong, Sylhet, Dhaka, Rangpur, and Mymensingh divisions (IDMC, 2021). The Disaster and Relief Management Ministry collaborated on emergency relief assistance with other stakeholders. In the same year, the government started providing houses to 4,409 climate refugee families under a climate refugee rehabilitation project called "Khurshakul Ashrayan Prakalpa" in Cox's Bazar, one of the climate hotspots in Bangladesh.

6.3 Background of the policy Response to Climate Change

The climate-induced vulnerability in Bangladesh is not new. Many places in the country have been highly vulnerable to disasters. In order to manage the effects of climate change at the national level, the Bangladesh government has created several policy measures and regulatory frameworks over the years. This author, however, could not locate any research or publications evaluating the success or failure of these measures. Most of the documents focused on adaptation and hardly touched on displacement strategies. In many cases, implementation of these policies was limited to flood management schemes, coastal polders, cyclone and flood shelters, and raising roads and highways above flood level.

Many developing countries like Bangladesh are highly vulnerable to climate change, where adaptation comes through eradicating poverty and achieving economic and social well-being for all its citizens. However, considering Bangladesh’s records of disaster-induced displacement, increasing disaster risks, the rate of land-use change, ecological degradation, and population growth, the country cannot ignore the responsibility of producing and implementing its displacement strategies.

Recently, the country has realised the disaster risks better and taken a new adaptation approach of investing its funds and consulting with various stakeholders, including affected people on the ground. This approach has primarily shifted into national and sectoral development planning. In this regard, considering climate change a different risk factor from broader issues, the government instead has included climate change in all relevant development plans, projects, and investments.

Several significant policy frameworks that are directly and indirectly related to the issue of climate change have been produced in recent years, as summarized in Table 6.1:

Name of the Policy	Publishing Year
National Adaptation Programme of Action (NAPA)	2005, Updated in 2009
Renewable Energy Policy of Bangladesh	2008
Bangladesh Climate Change Strategy and Action Plan (BCCSAP)	2009
Bangladesh Climate Change Trust Act	2010
Bangladesh National Action Plan for Reducing SLCPs	2012, Updated in 2018
Nationally Determined Contributions (NDC)	2015, Updated in 2021
Energy Efficiency and Conservation Master Plan up to 2030	2015
National Disaster Management Policy	2015
NDC Implementation Road Map	2018
Bangladesh Delta Plan (BDP) 2100	2018
Standing Orders on Disasters	2019
National Plan for Disaster Management 2021-2025	2020
Mujib Climate Prosperity Plan 2030	2021
National Strategy on Internal Displacement Management	2021

Table 6.1: Bangladesh's major policy response at the national level. Source: Improvised from Climate Change Initiatives of Bangladesh, 2021.

The central ministries involved in responding to climate change are the Ministry of Environment, Forest and Climate Change; Ministry of Food and Disaster Management; Ministry of Water Resources; Ministry of Local Government, Rural Development and Cooperatives; Ministry of Agriculture; Ministry of Livestock and Fisheries; Ministry of

Power, Energy and Mineral Resources; Ministry of Health and Family Welfare; Ministry of Roads and Railway Division; Ministry of Communication; Ministry of Foreign Affairs; and Ministry of Planning Commission which are charged with the framing of development plans as well as approval of programs and projects (BCCSAP, 2009). However**,** the scale of the displaced population is enormous. Researchers have warned about these risks, but how these collages of ministries begin to understand the problem's scale and nature and possible solutions are still to explore.

The above policy documents (Figure 6.1) do not have any foresight on the drivers of internal displacement, the areas that are likely to be affected, and a plan for what will happen to the displaced population. The lack of comprehensive data on who is being displaced, where they are going, and for how long leaves a void in the aforementioned policy solutions. Is it a question of having comprehensive data, or does it require a flexible system to respond to this kind of shock? Then the question comes, what kind of flexible system does the country require to deal with being at-risk of 30 million displaced people, especially for Bangladesh with a massive labour surplus and land shortage and where most of the towns already have informal settlements?

There was an ongoing debate in the policy circle on whether displacement could be an opportunity for the secondary towns if the migration could be directed towards the smaller towns that could grow rather than people ending up in Dhaka. However, creating livelihood opportunities for those with minimal skills to earn a living in the city setting is still a vast study area. It is clear that Bangladesh cannot adapt as it anticipated. It needs a different level of support.

6.4 Policy Responses Around Climate-Induced Displacement

The country produced the National Plan for Disaster Management from 2016 through 2020, where it has identified specific roles and responsibilities of different ministries to achieve the targets of the Sendai Framework for Disaster Risk Reduction (UNDRR, 2015). Earlier to SFDRR, Bangladesh Climate Change Strategy and Action Plan (BCCSAP) was developed in 2009 entirely by Bangladeshi experts and funds

coordinated by the Ministry of Environment and Forests. The document describes a ten-year program (2009-2018) to build the capacity and resilience of the country to meet the challenge of climate change over the next 20-25 years. Among 44 programs in this policy document, "Monitoring of internal and external migration of adversely impacted population and providing support to them through capacity building for their rehabilitation in a new environment" is one with a goal of "developing a monitoring mechanism of migration of climate-change-affected people and monitoring of internal as well as external migration" (T4P6). Although thousands are displaced annually, the program is a long-term strategy allocated to the Ministry of Environment, Forest and Climate Change, Ministry of Home Affairs, and Ministry of Local Government, Rural Development and Cooperative. So far, no specific data for internally displaced populations nor any projects on how climate-induced displacement is being managed were not found on their websites.

Historically, the government's significant policy responses until 2020 did not prescribe any detailed plan of action for climate-induced internal migration, i.e., displacement prevention and managed relocation. For example, the National Adaptation Programmes of Action (NAPA, 2005) has not provided any strategies for disaster and climate-induced internal displacement (DCIID). The Bangladesh Climate Change Strategy and Action Plan (BCCSAP, 2009) mentioned climate-induced displacement; however, it did not consider DCIID an immediate risk. The Bangladesh National Parliament enacted the Disaster Management Act (DMA, 2012) to formulate rules to build up the infrastructure of effective disaster management to fight all types of disasters. It drew attention to the importance of emergency shelter; however, it did not highlight any long or short-term solution for those whose homes have been washed away.

In 2018, the government of Bangladesh developed the Bangladesh Delta Plan (BDP) 2100 with the help of the government of the Netherlands as part of an international policy transfer (Alam, Heer and Choudhury, 2018). The government of Bangladesh has assigned its General Economics Division (GED) to the planning commission for overall coordination, facilitation, monitoring and evaluation of the project. It aims to support the ' 'country's long-term, integrated, and holistic water and land management in the

face of resources, climate change and human activity. The planning document acknowledges that less frequent but more intense cyclones would decrease the real GDP by 45% by 2050 in the coastal zone, and the country is highly likely to increase displacement (Lázár et al., 2020). However, there is a very few specific strategic action plans for managing disaster-induced displacement risks at the local, regional, national and internal levels.

Recently, the government developed the National Strategy on Internal Displacement Management (NSIDM, 2021), a displacement policy framework focusing on a legal mandate dedicated to an institutional arrangement. The strategy is designed based on the UN Sendai Framework, UN Guiding Principles on Internal Displacement, 1998, as well as the 2030 agenda of Sustainable Development Goals (SDGs), which recognised that governments and the international community must do more to reduce the risk of disaster-induced displacement before a disaster strike using risk reduction and adaptation measures.

Where displacement cannot be prevented, NSIDM aims to protect the rights and entitlements of the people during the evacuation and throughout displacement until durable solutions such as return, local integration, or resettlement can be facilitated. The policy document suggests the following Displacement Management Framework (DMF) in line with IOM's Migration Management Cycle (MMC), which identifies different phases of displacement:

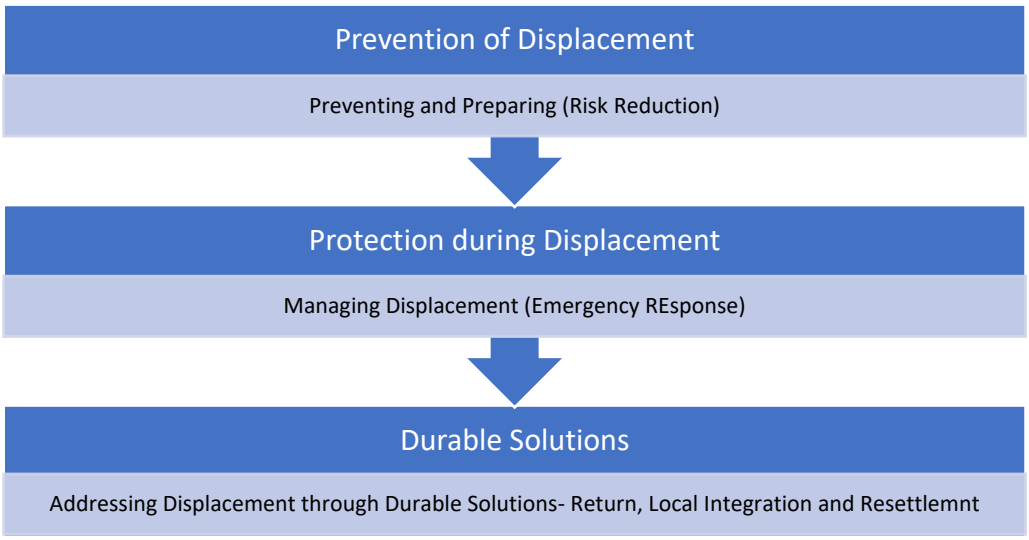

Figure 6.2: Displacement Management Framework (Source: SIDM, 2021, p7)

Bangladesh's displacement policy can't just be at the national level or a future task. For Bangladesh, displacement due to environmental stress is already happening in multiple places every year. Yes, the country needs to have disaster risk governance strategies at the national level, and the NSIDM policy paper acknowledges that it is essential to have a disaster risk profile and disaster impact map at the local and regional levels. The policy also advocates for a disaster management plan at the district (DDMP), Upazila (UzDMP) and union (UDMP) levels. It allocates institutional arrangements and funding and aims to create a common multi-stakeholder platform where GoB, NGOs, private organisations, researchers, volunteers, technicians, and policymakers can jointly pursue the implementation of the strategy. The policy also mentions a National Task Force on Displacement (NTFoD), the highest decision-making body, to review the implementation of the strategy. The Task Force must follow up with line ministries and government departments regarding their implementation plan and efforts. The Mujib Climate Prosperity Plan: Decade 2030, another policy document, visualises the ambitions and oversees the acceleration of the implementation of the nation's climate resilience strategy and low-carbon development (MCPP, 2021a).

Along with other policy documents, it recognises that the impacts of climate change are going to reduce 1.19-3.02% in GDP per year by 2031, loss of 17% of land surface and one-third of food production by 2050, and around one-third (30 million) of Bangladesh's population is at risk of displacement by 2100. In response to these eminent risks, the policy recommends sector-based and locally-led resilience strategies through the Ministry of Local Government, Rural Development and cooperatives in collaboration with the Ministry of Planning and the Ministry of Finance. It aims to protect internal displacement by a more decentralised and resilient 'My Village – My Town' approach where people with minimum adaptive capacity can have the maximum benefit of growth.

Like above, Bangladesh has developed many policy documents around disaster management, adaptation, and displacement. First, the government needs data to implement policies on prevention, protection and durable solutions to disaster-induced displacement. National Strategy on Internal Displacement Management stipulates that

the Ministry of Disaster Management and Relief should develop a national displacement tracking system and register IDPs (NSMDCIID, 2015; NSIDM, 2021). There, however, no systematic national data collection system exists. Bangladesh's policy development methodology has been criticised as none of the existing policies addresses displacement due to a conflict (IDMC, 2021).

6.5 Limits to adaptive capacity under sudden and gradual disasters

Limits to adaptive capacity and displacement can be explored through the lens of place relations, because place relations change over time in an increasing at-risk place. Exceeding the threshold in each component of dimensions of place relations can help us understand how the aspiration of voluntary non-migration turns into migration aspiration.

Every household under increasing environmental stress is more or less sensitive to the hazards. However, the more sensitive households reach their adaptive capacity threshold earlier. For instance, even if the exposure increases, some households have better livelihood capitals and awareness about the risks. They are less sensitive than those with minimum livelihood capitals and awareness of the risks. Less sensitive households have better adaptive capacity; therefore, their adaptive capacity threshold is better than those that are more sensitive to the same exposure. After this, their drivers of non-migration, in this case, the voluntary dimensions of place relations, are likely to decline.

The dimensions of the place relations concept can help researchers assess at-risk households' motivations for migration and non-migration. The interrelation between exposure, sensitivity and adaptive capacity can explain plainly the changes in place relations – how drivers of non-migration transform into migration and how relationships with the place change over time can be explained using the following figure 6.3.

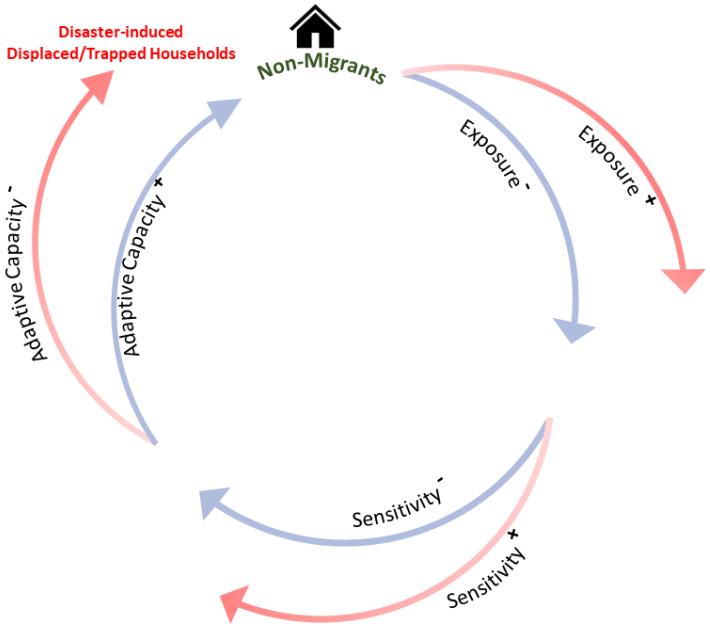

Figure 6.3: The interrelationship between exposure, sensitivity and adaptive capacity transforms non-migrant households into displaced households under increasing environmental stress. Source: Author

For example, one of the voluntary dimensions of place relations in this study is 'livelihood opportunity. More than half of the respondents indicated that they live there because there are opportunities for income through their familiar livelihoods. As the risk of disaster increases, lack of employment and declining agricultural productivity can be their primary reason to migrate. Dimensions of place relations concept can be useful assessing who is at risk, how vulnerable they are, and their threshold of adaptive capacity. The result is crucial in projecting from where and how many households are at risk to be displaced.

Place obduracy is likely to remain strong even when the threshold of adaptive capacity is near. But, if the household is aware of their current loss and damage scenario in the context of vulnerability to climate change, their risk perception is likely to change. Risk perceptions are interlinked with place obduracy. Because if the households are not aware of the risk, highly sensitive households are more likely to have high place obduracy. This means fewer livelihood opportunities, unawareness about the actual climate risks, and high place obduracy; all these voluntary dimensions of place relations

can make at-risk households more vulnerable. Existing structural constraints can only add to these vulnerabilities, and disaster management and risk reduction governance will become more challenging.

6.6 Preventing and protecting disaster-induced displacement and Place Relations

Bangladesh has a disaster risk management governance in place (NPfDM, 2021; MCPP, 2021b). However, that does not detail who the households that need to be relocated to and what preparation and management are required to move in time, with safety and dignity. When it is highly likely that more people are at risk of being displaced regionally and even internationally from the hotspots, a system must be in place to identify and manage where, when, how many, and where to go. If we understand more clearly why people stay where they are and how their adaptive capacity gradually reaches its limit, this planned relocation will be more successful. Moreover, as this study finds livelihood opportunities to remain in at-risk places, the government is investing in structure, creating livelihood opportunities and strengthening relationships with at-risk places.

In an increasing environmental risk condition, scientists and policymakers must implement disaster risk management, especially on how prevention measures (in situ adaptation) are likely to fail, which leads to the tipping point of adaptive capacity and preparation for displacement becoming inevitable. It is also crucial to understand the physical, economic, social and structural limits that influence adaptive capacity and the prevention and preparation for displacement measures.

The conceptual framework of the dimensions of place relations (Figure 5.1) discusses people's decision-making processes, which are essential to exploring the broader debate around limits to adaptive capacity and displacement. The dimensions of place relations can help us prepare valuable, meaningful, accurate and actionable data on household level non-migration decisionmaking. That data is required to assess how each dimension of place relation changes as the risks increase. It can be an overarching concept to study, predict, and manage displacement prevention and preparation stages.

From the non-representative sample of this study, it has been expolored of why households remain. Nevertheless, where they are, that place is at risk of not being viable under increasing environmental stress. If any state authorities or NGOs try to intervene in managing displacement, they must recognise these limits of adaptive capacity and that these residents are reluctant to migrate with safety. The dimensions of place relations explore the set of reasons why they are reluctant to go. These reasons need to be addressed as part of the strategy for prevention and protection from disaster-induced displacement. Including other issues around displacement, this non-migratory behaviour is also an important issue that is not on the table yet.

Tracing environmental migration, mainly how in-situ adaptation reaches its limits over time, is quite challenging for scientists. For example, a) identifying and categorising the drivers of livelihood shift and how livelihood vulnerabilities change as the environmental stress increase is challenging to measure; b) it is still challenging to draw an association between the limits of adaptive capacity and displacement. We know very little about how drivers of non-migration slowly disappear, and drivers of migration become prominent; c) it is also difficult to separate environmental drivers from other drivers of migration. Scholars are familiar that environmental drivers do not entirely trigger environmental migration, and d) not all drivers of migration are directly linked with disasters (Parrish et al., 2020; Chumky et al., 2022).

This study has just explored whether the multidimensionality of place relations can help further understand how households become sensitive to environmental stress. The findings of this study do not (neither the components nor the dimensions of place relations) enlighten us about the threshold or the limits of adaptive capacity, after which migration becomes the only option. However, multidimensionality in this context of place relation is helpful to categorise the factors of non-migration and how that factors become sensitive to environmental risks and force households to migrate. The approach is promising to be able to trace links between the limits of adaptive capacity and displacement.

Over two decades, many researchers have projected the linkage between human mobility from increasing at-risk areas (World Migration Report, 2022). The discourse

on climate change and migration has been increasingly seen globally due to environmental stress describing it as a form of adaptation (Black et al., 2011; Heslin et al., 2018; Remling, 2020). The process in which environmental migration develops in slow-onset changes has often been ignored, which has added challenges to planned relocation governance. Lack of understanding about the human-place relationship has also added challenges to studying the perceptions of environmental non-migrants in engaging in planned relocation governance.

The governance of relocation revolves around land rights, housing rights, tenure rights, and how the government can protect residents' rights when they are displaced to prevent ending up in informal settlements. Households become displaced and cannot settle again because they do not have the money to buy the land or tenure. They have to live on land that they do not own, like informal settlements and ultimately be evicted by the local authorities at some point.

If the local authorities, i.e., the disaster management committee at the union or village level, had current data on the components of each dimension of place relations, that would help to assess the limits of adaptive capacity and draw potential displacement maps at the local level (NSoIDM by MoDMR, 2021). The data helps assess as and when persons, groups of persons, households, or an entire community of that local area are highly likely to face the failure of displacement prevention measures. The sub-components of each dimension of place relations can support the key indicators of when displacement measure needs to intervene, which means when these affected people are obliged to prepare themselves to flee or to leave their habitual residence temporarily or permanently due to increasing sudden and gradual-onset environmental stress.

For example, the government of Bangladesh are building apartments (Figure 6.3: Ashrayan Prakalpa-2) for over four thousand households that lost their homes because of coastal erosion and cyclones.

Figure 6.4 High-angle view of buildings in Khurushkul project area constructed for internally displaced households in Bangladesh. Source: https://afd.gov.bd/activities/ashrayan-project.

However, no visible study is available on the residential satisfaction of these relocated people. Studying the residential satisfaction level of these people is crucial because the availability of livelihoods and sense of place at the new location are different from their place of origin (Biswas, Nasif Ahsan and Mallick, 2021). If the satisfaction level is low in the new place, these people can neither go back to the original place because the environmental risk is relatively high there nor stay in the relocated community where they do not feel strengthening relationships with the new place.

The findings of this study are essential because planned relocation creates new kind of place relations in the new place. If we create similar attributes of why these people valued the place they originally lived in, people will be more confident to engage with the new place. If we understand why a household lives in a particular place, and if we design their place of relocation in a way so that the relocated households find themselves easy to get attached to the new place, that would make the relocation initiatives successful. Because, residents are active in place-making. They change the nature of the place by living there, decorating it, setting up businesses.

6.7 Disaster-Induced Cross-Border Displacement and Place Relations

Under an increasing at-risk condition, when livelihood opportunities disappear, and adaptive capacity reaches its threshold, the conditions are highly likely to trigger food, water, economic, political, energy and environmental insecurity. Moreover, displacement forced by environmental disasters can trigger socio-political conflicts. The policymakers must assess the detailed scenario of 30 million at risk of being displaced in Bangladesh and embed strategies to minimise the risk of conflicts nationally and regionally. The numbers can also help us understand how likely this number will create a cross-border displacement. The projection can bring attention to the potential scale of future issues and call for urgency from the policymakers. Instead of fear mongering, policymakers can highlight what could happen if nothing or too little is done based on the empirical findings.

Empirical findings on disaster-induced displacement have gained increasing visibility, and people, policymakers, and governments have produced policy principles to address the complex topic. However, policy principles need to be translated into actionable activities at local, regional, national and international levels. The complexity of building policy around disaster-induced displacement internally and across borders is still a reality (World Migration Report, 2022). One of the reasons is the complex nature of the issue. The complexity around this debate is how much the drivers of migration are climate-related. How do we study that and draw the definition of disaster-induced cross-border displacement? In the absence of a universally agreed definition of climate-induced cross-border displaced people (climate refugees, as the media often uses), it is challenging to project emerging trends on the number of households moving in the face of disasters, projections related to the number of households migrating or getting displaced, and the data on households at risk.

The Sixth Assessment Report (AR6) of the Intergovernmental Panel on climate change (IPCC), has identified displacement as one trend that is projected to increase (Akter, 2009; Gemenne et al., 2021; UNHCR, 2021; IDMC, 2021). The direct impacts of climate change alone are not always causing climate refugees, but what it is doing is it is reinforcing underlying vulnerabilities. A combination of poor governance, lack of

preparation, and insufficient funds for disaster risk reduction make affected households more sensitive to these extreme weather events. If the government has a functioning contingency plan in place, the households are better equipped to battle increasingly extreme weather events and enhance the threshold of adaptive capacity (Brooks and Neil Adger, 2005; Henrique and Tschakert, 2022). If the households lack financial resources, are located in a marginalised area and have no system to respond to emergencies, the households become vulnerable easily (Thomas et al., 2021). These vulnerabilities are causing more impoverishment for people in developing countries to survive and increasing the risk of conflict and forced displacement. Evidence is available that lack of food, water, and livelihoods are linked to unrest, conflict and population movement (Kälin, 2019). Scientists and policymakers have accountability, the responsibility to be proactive, and to do more to enhance preparedness, protection, and support adaptation – not only for those who are already displaced but those who are going to be made increasingly vulnerable in the future.

Even though the study projects that the key current drivers of displacement are expected to increase the number of displaced people in Bangladesh (Chumky et al., 2022), it is still quite challenging to quantify climate-induced displaced people because the attributing characteristics, especially the gradual onsets, are not always directly linked with disasters. It is highly likely that secondary and, as yet, unforeseen drivers are likely to influence the displaced population. One likely scenario is, yes, a few displaced households from a village may find shelter in nearby villages or even be forced to head to urban slums in search of employment and a better life.

However, if the number of displaced households from hotspots becomes higher, nearby villages or cities are less likely to accommodate the higher number of displaced populations. This scenario is also highly likely to cause resource stress and trigger local and regional conflicts within and beyond borders (Jackson, Dugmore and Riede, 2018). Moreover, the displaced population in that scenario will have no option but to flee beyond the national border. International conflicts can also threaten national and even regional security.

Many migration management solutions are available to respond if a small number of individuals or households are displaced and seeking refuge. Humanitarian visas, temporary protection, leave to remain, regional and bilateral free movements agreements, and other existing solutions will not be adequate to manage the mass migration across borders. Currently, there is a lack of inter-state institutional and operational coherence regarding disaster-induced cross-border displacement. For example, the existing international refugee law and human rights law do not accommodate cross-border movements in the context of disasters and the effect of climate change. Mechanisms to distinguish between voluntary and non-voluntary mass migration in the context of disasters have hardly been elaborated.

Policymakers and governments need to prepare themselves to protect the rights of the climate-induced cross-border displaced population. It may be possible to claim eligibility for some of the climate-induced displaced persons; however, the 1951 Refugee Convention does not apply to the circumstances of the vast number of the displaced population while they are within the country of origin. The guiding principles of internal displacement specify the right to seek safety in another part of the country, the right to leave their country, the right to seek asylum in another country and the right to be protected against forcible return or resettlement to any place where their life, safety, liberty and or health would not be compromised. The big problem is how the government and non-government organisations will define the displaced population. What are those circumstances when adaptive capacity reaches its limits, and who are those entitled to refugee status? The Intergovernmental Authority of cross-border displacement needs to develop a protocol on where, when, and how many households are expected to be displaced to facilitate the safe entry, registration, and stay of member states affected by gradual-onset processes. Households at risk need to be assessed how their relationship with place changes through their vulnerability and adaptive capacity threshold.

Most of these instruments cover displacement caused by sudden-onset disasters, not caused by slow-onset environmental changes. Most climate-induced displacement is

caused by a mix of factors, where the drivers are indirectly linked to disasters. Isolating environmental drivers, particularly social, economic, and political drivers, is complex.

The result of this study is not a complete model, but it can support categorising the drivers and help formulate a framework to define limits of adaptive capacity at the household level and to protect their rights. It is likely to develop indicators of limits of adaptive capacity from the components of each dimension of place relations. If authorities can assess when and in what condition a household reaches its limits to adaptive capacity, they can initiate managed retreat protocol in time.

The model can help define climate refugees - identifying the appropriate household needing protection when disaster-induced displacement becomes a real threat across borders. Especially the destitute who do not have a specific livelihood would struggle to prove the link to climate and environmental factors. Getting clarity about what constitutes the root causes and drivers of displacement is vital. Existing laws and instruments of international organisations need to ensure a safe, orderly and regular relocation to minimise conflict and displacement. States of origin bear the primary responsibility for their citizens' protection, primarily when mass migration occurs because of climatic drivers. As this study finds many voluntary ties with the place at risk, there are so many other drivers that affect successful planned relocation. Intergovernmental authorities need to have data on where, when, and how many people are likely to be relocated to minimise loss and damage and avoid conflicts (Nansen Initiative, 2015).

The components of place relation can be a concept to enhance these insights and support the development of the data required for the authorities. A model can be developed to identify households that are reaching their limits of adaptive capacity. The authorities can map those areas using the model, enabling them to define cross-border displaced or climate refugee status.

6.8 Place Relations and Local Economic Development

In this case study, we see how new income opportunities in the at-risk environment keep the relationship with the place strong. Here, we discuss how human-place relations are a valuable concept that can change traditional local economic development policy in at-risk areas. Evidence from this study shows that local economic development encourages people to stay, providing income opportunities. However, these opportunities might not be in the best interest to stay for environmentally at-risk households. The core tension here is that the state promotes economic development and delivers substantial tangible improvements to local people. There are questions about the long-term sustainability and viability of these strategies. Moreover, there are concerns that these (short-term) benefits create a perverse incentive to keep people in increasingly vulnerable places, which are ultimately highly at risk of not being viable.

Development strategies, especially in the rural areas of developing countries, are different from those in developed countries. A significant number of the world's poor still live in rural areas, making rural development, and reducing and eventually eliminating rural poverty important (UN Department of Economic and Social Affairs, 2021). As a focus for policy and academic study, rural development, urbanisation and industrial development were central to economic growth to offer the quickest route out of poverty. Bangladesh is amongst the fastest-growing countries in the world, has cut extreme poverty in half, lifted 25 million people out of poverty, and emerged as a low-middle-income country within only a span of four decades (ERD, 2021). The study area of this study, Patuakhali, is also going through the same approach to national economic growth. Poverty reduction is such a priority because it is the key to success in enhancing resilience to climate change. In fact, development for Bangladesh means establishing climate-centred support mechanisms in every sector and financial aid for mitigation and adaptation practices to spur and enable the transition towards low-carbon, climate-resilient growth and development through enhancing adaptive capacity. For instance, keeping the tourism industries of Kuakata at its centre, various livelihood opportunities are being created. Households who used to rely heavily on coastal fishing and farming

can take these livelihood opportunities on and strengthen their relationship with at-risk communities.

However, reducing the poverty of an at-risk community through investing in tourism-related livelihoods is not the end goal — the viability of economic development and well-being. Ensuring environmental justice also needs to be central to sustainable rural development. Moreover, in rural areas where increasing environmental risks threaten people's lives and livelihoods is not business as usual. Development in this context concerns the strategies people opt to cope with poverty and disasters and, when needed, escape from them. Just adaptation, or just economic development, neither one is enough for these households (Singh, Gajjar and Deshpande, 2016; Stringer et al., 2020). Rather, this is a question about the long-term sustainability and viability of development interventions.

Good development for these households is to draw a development strategy keeping adaptation at the core. Because security from disasters and the development of rural livelihoods are fundamentally about improving the adaptive capacity of rural people and a major element of rural poverty reduction. Ignoring traditional livelihoods, specifically smallholding agriculture, fishing, and many local businesses, and turning rural areas into industrialised cities like Kuakata lack many interlocking facts and perspectives. For example, the land price has gone up due to increasing demand to build tourism infrastructure - farmlands are being sold. The land use change can add up to the existing risks to Kalapara. Most smallholding farmers have cash with no alternative skills making them more vulnerable in the long run because disaster risks and development vary across space and time.

There are studies that claim that fewer people migrate from at-risk conditions (Mallick and Schanze, 2020), and more people carry on until the place itself is reclaimed by the rivers or seas (Oakes et al., 2017). Evidence is also available at this point that displaced people, rather than migrating internationally, are more prone to resettle in nearby villages or cities where uncertainties associated with livelihood opportunities are minimised, and existing social networks can be taken advantage of (Haas, Castles and Miller, 2019; Piggott-McKellar et al., 2019). In the context of increasing environmental

stress, non-migration and rural development practices can blend into a process that supports the disaster management policy frameworks taken by the local, regional and national authorities.

In the context of increasing at-risk places like Kalapara, neither adaptation nor development on their own is enough. Development in Bangladesh has focused on creating traditional jobs and livelihoods without considering imminent climate-induced risks. Barely any attention has been given to adaptive capacity's environmental risks and temporal nature (Monirul Islam et al., 2014; Bhowmik, Irfanullah and Selim, 2021). The underlying evidence shows that the countries, primarily low-income and politically or culturally marginalised, are the most at-risk and have the least adaptive capacity from the increasing impacts of climate change (Eriksen et al., 2007; Carpenter and Brock, 2008; Karki et al., 2021). This is where adaptation and development merge, and increasing adaptive capacity becomes a part of development. Exposure and sensitivity to lives and livelihoods must be at the development framework's heart. Because adaptation in the context of climate change is a process in which exposure to environmental stress increases, resilience mechanisms fail to work, and communities become more sensitive to the impacts of the day (Gemenne and Blocher, 2017). There is a point at which adaptive capacity reaches its limits in staying situ, and affected people are forced to migrate (Heslin et al., 2018) – and indeed, such migration is a positive and rational adaptation strategy. Given that adaptive capacity has a limit, the question of how long the current and future adaptive mechanism can ensure safety and well-being needs to be kept at the core of the development mechanism.

6.8.1 Policy recommendations around local development and place relations

This study addresses the drivers that influence why at-risk households decide to remain. Authorities need to consider this non-migration behaviour while designing local development policy practices. Policymakers also need to follow how the place relations of at-risk households evolve under increasing environmental stress. The author did not find any credible mechanism ensuring the development initiatives' vulnerability, adaptive capacity and sustainability.

In Bangladesh, a weaker legal framework, institutional incapacity, and corruption have made communication across ministries and different levels of authority difficult, making the current practice of centralised decision-making an inefficient proposition (Hossain and Habib, 2021). However, decentralisation, the transfer of decision-making power and responsibility policies from the national to the regional, sub-regional and local levels, started long ago. The Local Government Commission of Bangladesh recommended the Local Government (Union Parishad) Act 1997, the Upazila Parishad Act 1998, and the Zilla Parishad Act 2000 to devolve fiscal power to the local governments. Theoretically, the power transfer to the very lowest level (Union Parishad) takes place through the units of central government ministries, their subordinate units, and other government and non-government authorities and organisations.

Decentralisation is a good prerequisite for the development of at-risk areas. Every community has its unique set of risks, resources, and adaptive capacity. Empowering the local government to properly utilise the budget allocated for climate adaptation and green development is imperative. Therefore, what development policy works the best for a specific village and how to adjust the development practices as the risk increases and how long this development practice is likely to contribute towards enhancing adaptive capacity without making this village trapped must be decided and led equally at all levels. An inclusive, equitable, locally-led, bottom-up policy approach can be the missing piece of an effective policy plumbing (Masud-All-Kamal and Nursey-Bray, 2021; Stock, Vij and Ishtiaque, 2021; Soanes et al., 2021).

The analytical framework of this study suggests that, along with other dimensions, livelihood opportunities play an important role in making non-migratory decisions. However, these are not the only drivers that influence decision-making. Therefore, affected households need to have access to scientifically assessed and trustable information on disaster risks at the local level. Development initiatives for Kalapara need to focus on less environmental dependant livelihoods as well as disaster risk management in place to govern when to retreat with dignity from the inhabitable area.

Rural development strategies in this context of Kalapara also need to consider the vulnerability-resilience nexus: a) *exposure* to the impacts of disasters- some villages are more or less exposed to a particular set of disasters, i.e., coastal erosion, cyclone and salinity in one village compared to other villages due to its geographical location; b) *sensitivity* to the impacts of disasters- to what degree those households are sensitive to that particular set of disasters – boat owners are less sensitive to fishers as they have more secure homes and capitals to cope; and c) the *adaptive capacity* of the affected households- their ability to adjust with the exposure and minimise sensitivity to that set of disasters using assets, networks, and skills. This exposure-sensitivity-adaptive capacity nexus determines how vulnerable the village is and how much the households living there can adjust themselves using their existing and accessible development mechanisms.

This research finds that all three voluntary relationships with the place are likely to strengthen as livelihood opportunities increase. However, rural development needs to be understood as the disaster risk increases what the households need to have a resilient life. Challenges and potentials of all stakeholders at the local level need to identify the solutions and compromises on exactly how to do that work. Simply, development practices must take future disaster risks into account. The basis is to understand who lives in the households, what activities the residents are engaged in, and what this means for the resources and future needs. Climate-smart livelihood opportunities create enhanced adaptive capacity— more local and detailed risk mapping help to minimise the gaps between actual and perceived risks. Moreover, being lived in a place for so many years or most of their life, the obduracy of that place is already strong. However, being unable to point out when to overthrow this voluntary attachment to the place may work as a boiling frog syndrome, where voluntary relationships with a place make these households more vulnerable, deepen the structural constraints and eventually trapped into conflict and even death.

This study also found that the communities are looking for development in shifting traditional land uses to non-agricultural livelihoods, i.e., the tourism sector. However, the local authorities hardly consider climate change and population growth regarding

land-use change and surplus labour. Fast transforming from environmentally at-risk rural communities into tourist destinations with minimum consideration of increasing risks is not sustainable. Many stakeholders have different interests in developing rural areas like Kalapara into a tourist sport. The important thing is to negotiate with all stakeholders to ensure sustainable livelihood transformation. The development approach needs to promote a dialogue between the government, the local population, civic organisations, and the private sector involved in this transformation process. Currently, most development policies come from the central government, and the local government implements very few. An equally coordinated development approach can lead to improved discussions about using available local resources and future development opportunities for the households in this area.

Nevertheless, the development approach also needs to consider the simultaneous representation of local authorities from other sectors, such as fishing, tourism and small enterprises. A development approach appropriate for one village is not necessarily appropriate for another. National and regional authorities needed to integrate local authorities in designing livelihood vulnerability maps and recognise local strengths and opportunities to minimise those vulnerabilities. In recent years telecommunication systems have opened new opportunities for fishers to compare markets for their fish and get the best price for their catch. Authorities at all levels can enhance support for less environment-dependent livelihoods, i.e., garments and food processing industries, to build new plants to create alternative livelihood opportunities in those climate hotspots. Integrated markets and improved communication can increase this livelihood diversity in places and times.

Therefore, academics and policymakers need to be aware of these limits and diversity in opportunities and challenges when designing appropriate development policies for that area's land, water, and air. These require a cross-sector discussion about existing resources, risks, and sustainability. Based on the households scenario, development policies must prepare how the households need to develop safe, sustainable, and resilient over the long term with increasing risks. Affected households, individuals, communities, policymakers and development agencies need to understand better the

opportunities and risks these people face simultaneously. Rural development frameworks must highlight the households' strengths and weaknesses, appropriate resources and skills for their livelihoods, the risks they are in and how different development initiatives may affect their relationship with the place in future, keeping the limits of adaptation in mind. Only then can the safe and sustainable development concept for these households become practically possible.

In the case of Kalapara, the district (Patuakhali) and divisional (Barishal) administrations, in particular, have an important coordinating function with the people and the ministries. Central Ministries need to ensure financial and strategic support to the local subordinates to produce such policy documents and action plans. Developing a comprehensive disaster-risk-centred development strategy by the local authorities for the villages of Kalapara becomes crucial to ensure these at-risk households' safe and sustainable development. From Kalapara, the regional authorities in Patuakhali and Barishal need to forward the strategy to the ministries. Authorities at all levels then ensure equal partnerships in allocating funds and resources and take equal responsibilities in implementing the local development policy. Promoting integrated development of these at-risk households can enhance their adaptive capacity in well-functioning, sustainable and developed communities. Moreover, by linking several at-risk communities in Patuakhali and with other coastal hotspots, additional value can be created at a larger scale locally, regionally, nationally and even globally because only an operational decentralised structure of development facilitates the transfer of national development strategies to the local level.

6.9 Informed adaptation and Place Relation

In this section, we continue discussing how adaptive capacities reach their limits, how these limits are directly linked with place relations and how basic information about climate, risk, and vulnerability can enhance adaptive options and mute the limits of adaptation. Trustable scientific information on the risks helps to make informed decisions, including when to migrate (Parrish et al., 2020). Informed adaptation is related to economic development. When talking about adaptation, we consider

exposure, sensitivity and adaptive capacity. If people are aware that these are the current risks, these are the imminent risk, and these are the risk in the next 30-50 years, and this is how far we can adapt using these resources and skills, and if the risks continue to increase, beyond this point our adaptive capacity is likely to start falling, having been able to interpret the risks, these people's adaptive decisions are informed.

Now, how do we assess these risks-adaptive capacity-migration nexus over time? This is where place relation is related to informed adaptation. Households must be able to make informed decisions and be aware of how future risks will change their relations with the place. Informed adaptation is tailoring the adaptation policy and practices, considering the risks a particular place has in the short and longer terms. It also includes how increasing risks will make livelihood resources vulnerable and how adaptive mechanisms must adjust to make alternative livelihood outcomes successful. For informed adaptation practices, the affected household must know their exposure, sensitivity, adaptive capacity, and when to move.

As the impacts of disasters are place-specific, so is the adaptation. It is known that increasing environmental stress decreases people's ability to adapt. Especially households in this study whose livelihoods depend on agriculture and aquaculture are particularly exposed because they live near the coast or rivers and may have been displaced several times over the years. Many of these households, mainly subsistence farmers and workers in fishing, find themselves challenging to absorb repeated economic losses caused by sudden and gradual-onset disasters, and in the longer term, their ability to adapt decreases.

For example, this study found that fishermen had to set back home during the fishing season and alternatively leased land and started farming because of more cyclones. However, increased salinity destroyed the farms and the crops. The availability of fresh water and food made life more challenging. Day by day, the household becomes more sensitive to the availability of livelihoods, access to fresh water and food, health, and well-being. As the sensitivity increase, the adaptive capacity decreases. For example, as the local livelihood resources become unavailable – fishers return empty hands from fishing, or cyclone stops them from going fishing, crops get damaged, and household

income and assets disappear. The household becomes in debt, and the confidence to search for new livelihoods and maintain sound health and well-being becomes a nightmare. These are the scenario of the limits of adaptation and carrying on living become impossible.

Households like these are usually repeatedly affected by sudden and gradual-onset disasters. The disaster profile of at-risk places is likely to change over time. Usually, successful adaptation to climate change for these households usually means staying put and adjusting to the environmental stress by building dams, bridges, roads, sewers, and canals, switching to crops better suited to drought or saline conditions, and finding alternative livelihoods locally. It is, in fact, the non-migrants that are the initial actors of adaptation. Within the increasingly stressful conditions, these people try to adjust their lives and livelihoods to live there. However, as the magnitude and frequency of the disasters increase, adaptation practices, i.e., shifting livelihoods, become more challenging, and voluntary components of place relations fade out.

Initially, environmental stress manifests through livelihood vulnerability, followed by decreasing adaptive capacity. Affected households engage in adaptation through livelihood diversification (Biswas and Mallick, 2020). However, livelihood diversification's success depends on available assets, resources, skills, social networks, and how long these households can stay put and adapt. These components of adaptive capacity are directly and indirectly linked to environmental stress. Increasing livelihood challenges lead to the limits of adaptation (Dow et al., 2013b; Beard et al., 2021), and at the same time, voluntary relationships with place decrease. Especially on the gradual-onset environmental changes, the way affected households respond to their vulnerabilities and adaptation practices are pretty complex because their adaptation decisions depend not only on their vulnerabilities but also on their economic, social, psychological, and physical conditions. Moreover, displacement in this increasingly stressful environment is usually seen as a result of exceeding the limits of in-situ adaptation (also called tipping points) practices.

These various thresholds of adaptation are directly linked with migratory and non-migratory decisions. Dimensions of place relations can accommodate these drivers of

adaptation limits and be studied under forced and or voluntary relationships with the place. For example, once a household perceives an extreme weather event as a test of God, as the household receives scientific early warning and an impact and response systems in detail, their perception of the risks is likely to change slowly.

Also, if the livelihood opportunities become too risky, increasing loss and damage make the livelihood not viable for the long term, and livelihood opportunities that once created a voluntary relationship with the place disappear. Eventually, with this decline in adaptive capacity, households become trapped (Rahman, 2022). Households in Kalapara in Bangladesh and countries in similar situations need financial and technological support and compensation to enhance risk reduction and safety nets.

If these households had information about the risks they are in and at what point in situ adaptation practices are likely to make them trapped instead of making them resilient, these households could move while they have increased adaptive capacity to migrate. But now, how do we assess that tipping point of adaptation? We can not assess the tipping point of in situ adaptation using dimensions of place relation. However, it helps us understand that in situ adaptation has a limit, and voluntary non-migrant households become trapped in that at-risk area. The sub-components of place relations can help to model and determine the drivers of in situ adaptation limits. For example, if the households get access to scientific and trustable information about the risk, that is highly likely to change the ' 'household's risk perception and help them make informed adaptive decisions, including whether to stay or prepare to migrate.

Risk perception is an overarching component of place relations. The scientific and trustable information changes risk perception and helps the household make informed adaptive decisions. This change in risk perception can be interpreted as changes in one of the dimensions of place relations. Similarly, if scientific and trustable information on how disaster risks are going to increase loss and damage to household's livelihoods and to what extent that would decrease their adaptive capacity, the information is likely to help the household in making adaptive decisions, including whether, if yes, when to start looking for a safer place. Point to be noted that abandoning one’s home and livelihood might also be seen as a failure of adaptive capacity when it is not done

voluntarily and should not be framed as transformative capacity (as suggested in the resilience literature).

6.10 Conclusion

The result of this study finds that the local people do not always have the most robust understanding of climate change risk and uncertainty associated with their lives and livelihoods and, in many cases, despite hardships and risk, display a degree of place obduracy that makes them reluctant to leave their homes to which they have complex psychological, social and cultural attachments. Households do not understand the scale of future risks and the potential that where they live is at risk of being uninhabitable. Community-based adaptation tends to encourage local knowledge, but we are now facing threats beyond their lived experience and beyond the scope and scale of local people to understand easily. Understanding household's motivations to stay in at-risk locations is critical in order to provide the support that fits their needs and circumstances, and that will be well received.

We also must pay attention to how households make decisions that might seem irrational to outsiders. Place obduracy is not necessarily a manifestation of ignorance – there are sound, rational reasons why households might prefer to stay where they are despite the risks and hardships that they face.

Science is important, but it needs to be accessible at every at-risk Union, the lowest administrative level in Bangladesh (Demirci and PEKER, 2013; Krauß and Bremer, 2020). Local governments must declare climate emergencies and ensure the use of sciences to tackle imminent risks of displacement because the stakes are high and demand urgent decisions. During this data collection, the author found that the local households do not usually have access to scientific projections about their village for the short, medium and long-term risks. The risks and adaptation information appropriate for them, therefore, has to be produced by the scientists. Local, regional and national governments must ensure these risks and adaptation information are produced collaboratively.

Also, flexibility in programming, learning, and monitoring adaptation initiatives is crucial in making adaptation initiatives successful (Noble et al., 2014). All agencies involved in the adaptation process must be accountable for making initiatives transparent so households can rely on the information. This is crucial because this study finds that households are not aware of risks and vulnerabilities. Actors need to prioritise risks and vulnerability awareness to make the adaptation initiatives accepted by the households. Also, collaboration across all levels of actors and donors is crucial to enhancing the adaptation process's efficiency. This decentralisation of power and accountability in the locally-led adaptation practice means power to make adaptive decisions are equally distributed among all the agencies. By doing this, local actors feel the ownership of decision-making, and it is more likely to have informed adaptation systems in place for the targeted households.

Making a public policy and recommending responsibilities to various authorities is easier. However, those are not all. An effective policy-plumbing (policy framework, in other words) ensures resource miss allocation is avoided at all times. Having decentralised governance, ensuring equal partnership at all levels, including the affected households, and avoiding resource miss allocation is albeit a big challenge, especially for developing countries like Bangladesh. However, the problem's scale and nature do not allow any loose fittings in the policy plumbing.

In this regard, the people-centred policy framework needs to identify who has more potential to diversify their existing livelihood and who is willing to transform. Not every household will diversify their livelihoods successfully or have the same capacity. However, how more community members can benefit from the policy is also a significant part of good policy plumbing. Currently, the budget allocation in Bangladesh is being influenced by political figures rather than where it is needed. Whereas central policy strategies and resource allocation need to be based on local and regional disaster risks, local people need decision-making power to implement the policy and resources.

As this study shows, financially poor households (smallholding farmers, fishers, labour or local businessmen, etc.) living in increasing at-risk conditions have the potential to become successful entrepreneurs. However, most of them usually do not have the

opportunities to build the required skillset or have access to financial resources to start an enterprise. Even if they try, the struggle these households have to go through to start a business often fails, or very few of them can make a success because these households do not have the necessary livelihood assets, clear objectives and strategies, or the opportunities to overcome the contextual and structural constraints. If the existing policies had effective plumbing in place, these households were more likely to have better education, finance and markets, so more of these households had more potential to make more successful livelihood outcomes. These households can be benefited from climate-resilient coping systems and production technologies, livelihood protection, and adaptation against the increasing risk of disasters.

An overly centralised approach, where ministries and civil servants decide strategies and objectives without offering the lead to the local communities or giving equal partnership to the local authorities to deliver the policy, is likely to end up with poor coordination and eventually become critically ineffective. The targeted policies need to be tested to determine whether they fit the purpose, i.e., whether the affected households have an interest and if they are willing to diversify their skills. Ensuring trust among all the stakeholders by creating awareness on how exactly the policy will be implemented, how these policies are the best fit for these households to thrive, and how quickly the policies can be implemented without a complete systemic change are also very important. As a result of a successful policy plumbing, the affected households survive and thrive. This means the households will have a disaster risk management system in place that they can confidently rely on for the long term.

Chapter 7

Conclusion and Further Research

7.1 Introduction

Understanding the dimensions of place relations of households and individuals lining in at-risk places helps us explain a household's adaptive capacity threshold. The concept of place relations (Figure 5.1) contributes to our current understanding of preventing and protecting disaster-induced internal and cross-border displacements, rethinking local economic development, and planning for informed adaptation.

The thesis began by arguing that the literature on environmental migration highlights scenarios of sudden-onset disasters and very little on migration induced by gradual-onset disasters. Explaining migration induced by sudden-onset disasters is popular as they are easily understood. In this context, most people have no option but to leave home instantly. Firstly, the technical paradigm assumes that rational beings will migrate in the face of disasters; therefore, non-migration is explained through socio-economic ties, psychological attachments, irrational decision-making or a failure of risk communication. The approach does not fully portray the scenario of non-migration.

Therefore, research for this thesis originated with the investigation of human-place relationships in business-as-usual conditions followed by increasing at-risk conditions. It was decided to investigate factors associated with livelihoods and constraints on non-migratory decisions, as this field has been neglected comparatively. The literature review also revealed the lack of studies on non-migratory decisions. As a result, the methodological framework was built around place relations, accommodating both voluntary and non-voluntary factors that influence migratory and non-migratory decisions. The 60 household cases along the coasts of Kalapara, Bangladesh were selected to study for several reasons. The selected communities in Kalapara are affected both by sudden-onset disasters, i.e., cyclones and floods and gradual-onset

environmental changes, i.e., salinity intrusion, coastal erosion, salinity intrusion in farmlands, cyclones and storm surges.

People live on the coasts of the Bay of Bengal for many reasons. Not just the fishers but also subsistence farmers, local entrepreneurs, and informal workers who live (fish, rice, vegetables, fruits, and many other agricultural products) quite close to the sea are among them. Many of their homes and farmlands get flooded during storm surges. All interviewees experienced disasters, financial and non-financial loss and damage, but not all were prepared, willing or able to migrate. The interview study described in Chapters 5 and 6 was designed based on the existing literature on place relations, risks, adaptive capacity and non-migratory decision-making. Using semi-structured interviews and thematic analysis as a method to address the research question, this study found that every farmer has lost their crops multiple times a year due to these extreme weather events. All fishers know someone who lost their lives while fishing during cyclones. That did not discourage people from working in fishing boats, meaning that people in Kalapara are taking non-migratory decisions despite increasing disaster risks. The reasons for non-migratory decisions were categorised based on the dimensions of the place relations concept. The experiment showed how non-migration decisions take place in increasingly at-risk households.

7.2 Theoretical Contributions

The research problem which was set out in chapter one was the following:

Why do people stay under the conditions of environmental stress?

This thesis has answered the question by convincingly demonstrating the value of a more constructive approach to understanding human-place relations. It has shown the possibility of explaining non-migratory decision-making through the study of place relations. From the theoretical perspective, the result of this study is significant because the existing global theories of migration and non-migration in the context of increasing slow-onset disasters do not clearly specify how households make these decisions and to what extent they are voluntary and non-voluntary.

This research presents a four-dimensional conceptual framework (Figure 5.1) to explain and analyse why households stay under increasing environmental stress. This research also contributes to our understanding of how the drivers of non-migrations interact with each other. When environmental stress increases, scholars argue that non-migration is either involuntary or voluntary. However, our study tells us that it is a combination of both, and reaching the threshold of in-situ adaptive capacity is gradual. Scholars are aware of why people stay, but there is a gap in understanding the process through which the motivation to stay reaches its limit.

The concept of place relations helps us study those decision-making processes, especially with the dimensions. The research of this thesis is helping to rethink the way scholars traditionally have been thinking by placing greater emphasis on household and individual decision-making on their own relationship with place. Furthermore, this kind of framework, a conceptual and analytical framework, helps us break down traditional and more familiar ways of thinking about disaster-induced migration and non-migration behaviour.

More specifically, the findings of this thesis challenge our traditional understandings of migratory and non-migratory decision-making, which still tend to focus on a singular aspect of why people stay where they do and often overlook the significance of their relationship with place. The result of this thesis emphasises the necessity of taking a more inclusive perspective that considers multi-dimensional voluntary as well as forced reasons for staying under the conditions of a stressful environment. Therefore, this thesis addresses the incomplete academic literature, which tends to focus on one or more but is not inclusive enough to explain the context and answer the research question. This thesis does not claim to produce a complete conceptual model that structurally explains how each sub-component interacts with the other and their dynamics with exposure, vulnerability, and adaptive capacity changes. Instead, this thesis takes us closer to the insights and inspires us to take such approaches to manage the problem better.

The interview study rejects the assumptions that people stay in increasingly at-risk households just because they cannot migrate. It also rejects the assumption that the local people have adequate knowledge about the actual risks they are in. The interview study

suggests that an inclusive approach can reflect the importance of psychological and livelihood opportunities that significantly contribute to staying. The dimensions of place relations showed how voluntary and forced relations could be included in framing the relationship more holistically. This demonstrates that the forced and voluntary relations function simultaneously.

This thesis also provides fresh theoretical and empirical contributions to the concept of 'trapped population' as an element of the framework for understanding non-migratory decisions. More specifically, the concept of the trapped population is a forced dimension of place relations that accommodates socio-economic incapacity with individual decision-making. The concept of trapped population is subsumed within multi-dimensional place relations.

7.3 Empirical contributions

The place relations of 60 households in Kalapara can add new insights into studying the adaptive capacity of at-risk people. Especially, their aspiration towards non-migration can help us understand the temporal nature (limits of adaptive capacity) of place relations. In other words, this study gives new insight into Kalapara's non-migratory decisions while environmental risks are on the rise. Firstly, the study showed that the households in Kalapara held a mix of attitudes towards their relationship with the place they lived in. The qualitative study highlighted four distinct dimensions of relations which explain human-place relationships in increasingly stressful environmental conditions. Household members tended to live despite their increasing experience of loss and damages from the increasing disaster risks. This meant that households tended not to migrate but to recognise the impacts they faced through the loss and damage of their lives and livelihoods. Some of them think of migrating but have social and structural constraints which force them to stay, and they also have voluntary relationships with the place at the same time.

The combination of interview and thematic analysis identified the unique pattern in the place relations, which contributes to our existing understanding of the impacts of

disasters felt through life and livelihood losses and how this relationship pattern is likely to change over time. The result also helps us understand environmental migration in general, that it is not just environmental, not just voluntary, not just forced, but a combination of all of these elements. The context in which environmental migration takes place must be understood deeper and wider to assess, define and govern it.

This finding also indicates how environmental migration could be different in the future. The impacts of the slow-onset disasters, i.e., temperature rise, salinity intrusion, inundation and coastal erosion observed in this study, can devastate household assets and adaptive capacity and result in conflicts and mass displacement.

What we learn from the case study can also contribute to learning elsewhere in a different context. Case studies are transferable methods if they can be adapted to the context (Flyvbjerg, 2006b). The cases used in this study are a very specific group of people in a very particular part of the world, but they are also part of the more widespread problem. Because, the analytical framework has developed a new theory using case studies that makes it potentially applicable elsewhere. The conceptual framework of this study (Figure 5.1) says it is important to understand the context. But because context is so important, scientists need to develop a framework to understand the context so that it can be replicated elsewhere. It is not just a story of some people in Bangladesh. It is, but it is also can be a story in many other places of the world.

7.4 Methodological contributions

The method chosen for this research was a semi-structured interview and thematic analysis. So as to dive deeper into the non-migration decision-making, thematic analysis was followed by coding the interview segments using an inductive approach where the coding and theme generation are directed by the content of the data (Braun and Clarke, 2006; Chawla, Eijdenberg and Wood, 2021). The approach is one of the most traditional forms of analysis within qualitative research to develop nuanced interpretations of a phenomenon.

The author grew up not in the same region but in Bangladesh, speaks the same language and is familiar with the participants' culture and values. Interpreting interview quotes and linking them with theories were very exciting stages of writing in the result and discussion chapters. At this writing stage, the theories became more apparent to the researcher, and the research felt worthwhile. Making the use of interview data from a different language, Bengali in this case, was rare in understanding human-place relationships in the at-risk areas. The interview was conducted in Bangla, the author's first language and then an English transcription of the full interviews was produced by the author to ensure while recreated, the interim text reflects the original. As climate change is a global concern, more research approaches need to be developed which deals with research data in more than one language (Halai, 2007). Having a high degree of compatibility in both languages, translating full interviews of each participant is crucial to maintaining the high quality of the data. We need more research conducted by people who have some cultural, linguistic, and perhaps political connection to the places and people being studied.

In designing research frameworks and developing theories around individual and household decision-making, we need to use certain approaches to explain the reasons and processes behind certain migratory and non-migratory decisions. The macro perspective of change is that methods such as GIS and structured interviews are less likely to address this problem and offer a solution. Nonetheless, GIS can help us map a specific group of people and their movements. However, the methods have limitations in explaining the reasons and process of migration decisions, i.e., how and why exactly those migration decisions developed that way. Structured interviews offer specific answers to specific questions. It does not always allow the interviewer to follow the interviewee's flow and explore the decision-making reasons and process. As discussed earlier, migration and non-migration decision-making reasons and processes are not linear. They are interlinked social, political, economic and psychological aspects of lives and livelihoods. So, the interviewer needed to ask the next questions based on the response, and predetermined questions may or may not be appropriate to achieve the data collection objectives.

This study used semi-structured interviews to illustrate how each driver's contribute to non-migratory decision-making. The interview analysis was done using a qualitative data analysis tool called NviVo. The tool helped organise relevant code arrangements and systematic visualisations of critical elements and patterns. The phase of thematic analysis, as described in the methodology chapter, allowed for a systematic way of seeing as well as processing qualitative information using the codes.

This thesis demonstrates their utility for the investigation of non-migratory decisions and the methodological innovation of their combination. This thesis has shown that semi-structured interviews can be an effective tool to reveal attitudes towards human-place interaction, and to the author’s knowledge, they have hardly ever been used to investigate non-migratory decision-making in an at-risk place. Through careful coding of the statements used in developing a theme, the interview study effectively captured the interaction of economic, social, and psychological factors. Due to the flexible nature of the interview study, it can be claimed that the researcher was able to dig deep into the participants' attitudes towards the place they live.

Combining a set of theories with empirical data to build a concept that can challenge the existing understanding of disaster-induced risk management areas is quite a significant contribution to this study. They demonstrate the compatibility of using qualitative methods in understanding a context from multiple dimensions and generating themes that represent attitudes towards human-place relationships. In bringing these methods together, the thesis addresses the need for interdisciplinary research on non-migration to explain better how migratory behaviour changes as the risks increases. The methodology of this research is a qualitative case study approach. The wider significance of this work is that part of it is about understanding how we engage policy, and part of it is about understanding the context, but also there is a need for more research from this kind of perspective applying a similar approach to this one.

This qualitative study has not approached to test the quality and robustness in other places. There is no consensus on assessing any piece of qualitative work. However, clarity in the research question, appropriateness of sampling, testing methodology and

rigour of interpretation of results and level of contribution are crucial for any qualitative study (Leung, 2015).

7.5 Challenges

It is challenging to address how vulnerable people understand changing patterns of risk and how such changes influence migratory decision-making. This required an open-ended approach to avoid imposing the researcher's assumptions. It was challenging to draw the data saturation point for this study. The researcher did not have a precise assumption about all the codes or themes that might develop. Rather, the researcher took an open approach and looked for repetition in the interview responses. The livelihood category played a big part in reaching data saturation for this study. Household from different livelihoods has different vulnerabilities and different ways of interpreting loss and damage. Within each category, households have similarities in their vulnerabilities, reasons, and processes in non-migratory decision-making. The data collection for this study covered most livelihoods and their combinations in the selected communities of Kalapara. By looking back at the data, it can be said that the interview data collection was quite close to reaching a theoretical saturation point where no new codes were generated from the last interview.

However, it is essential to mention that local authorities and civil societies were not included in the interview. One of the reasons was that no local government authorities or non-government organisations were found that actively managed forced migration in that area. Secondly, the research question was to better understand the affected people's decision-making. Therefore, the research design avoided sources that could potentially add the risk of data pollution and the contamination of irrelevant and low-value information (Ben-Shahar, 2019; Zimmerli, 1986).

Translating the interview data from Bengali to English was time-consuming. Translating partial data was not an option, thinking of the high risk of loosing the context. Also, keeping the socio-cultural elements unbiased in the participants' oral statements was challenging. More available professional training on translating

bilingual data could help the researcher more. Currently, the University does not have an adequate system in place to train and ensure its researchers' ability to conduct research using bilingual data. It was also challenging to find academic studies on using bilingual data, especially from Bangla to English, on climate change and other social science or geography areas. The researcher did not find any credible pedagogy article on using climate change-related terminologies in Bangla. Therefore, the researcher used popular local terms and developed a brief explanation.

Data for this research was collected just before Covid 19. Transcription, coding, and conceptualising of the result were all done during covid. However, lockdown and shielding negatively impacted in-person activities, research and training. The pandemic also disrupted the time and health of the researcher. Also, lockdown and isolation impacted the researcher's mental health, and the research was delayed for over a year. The department faced its own challenges in navigating new barriers introduced by the pandemic.

7.6 Policy Recommendations

This research and the core conceptual framework of place relations have global significance as pressures on internal and cross-border displacement intensify. Building and implementing people-centred policies are among the great challenges faced by disaster risk management policymakers across the world. The results of this study can be helpful for policymakers because as the impacts of environmental change continue to increase, internal and cross-border displacement is likely to increase, and attitudes and potential behavioural responses of households at risk are an important first step toward designing relevant risk management programs. The existing policy for development, displacement and adaptation is based on the common theories associated with it in the context of rational choice of the households at risk. However, the context is different from place to place, and this study finds that the common theories aren't adequate to develop a targeted policy for these at-risk households. One policy for all would mean that households are at even greater boiled frog syndrome risk, a risk metaphor representing the household's inability or unwillingness to perceive and

respond to the increasing risks (Hanson-Easey et al., 2015b; le Ravalec, Rambaud and Blum, 2022b).

Conversely, this thesis demonstrates gaps in disaster risk management policy-making that the policymakers are accounted for. Those policymakers who think the households are likely to migrate as and when they perceive themselves to be at risk need to understand how and why attitudes and behaviour evolve with the changing context. The policy should be concerned about the households' attitude and further understanding of their decision-making. Policymakers need to recognise and validate the affected household's environmental risk perceptions, acknowledge the significance of place obduracy in household decision-making and build trust through engagement and public participation in disaster risk management policy. It is possible that eventually, through appealing to the households' risk perception, minimising the social-structural constraints, creating practically viable livelihood opportunities, and enlightening on place obduracy, these households can well manage the risks they are in. Suppose policymakers continue to assume that households will be benefited from a common development policy without having current and future risks and household behaviour at the core. In that case, the scale of the problem will likely threaten not just the development but regional peace and security.

It is unlikely that climate-induced displacement will not take place if the policies are successfully implemented. In a democratic country, although the government can legally force people to relocate, people will not necessarily accept the initiatives, and the electorate leaders are less likely to accept the outcome in return. As this study suggests that a sizeable amount of residents in Kalapara are likely to stay despite the increasing experience of loss and damage from disasters, policymakers need to be more concerned about why the attitudes are toward non-migration and understand how best this attitude can be managed to avoid further conflicts and uncontrolled displacements.

The previous chapter of this thesis suggested how changes in the policy are required to manage the disaster risks in Kalapara. If more households can identify gaps between perceived and actual risks, and assess vulnerabilities, then planning and monitoring practical, critical-structural, personal and co-generative adaptation, including managed

relocation, will result more effectively. In addition, the thesis has demonstrated how risk perceptions play a significant role in determining the non-migration attitude. The study suggests further investigation into how risk perceptions can be used in policymaking so that these households trust the policy initiatives. This is possible by investigating the social, cultural and religious routes that form their perceptions, which can also be used to change the way they perceive it now. As it is the government's stated aim to manage accommodation for the displaced, further policies considering how and when households become displaced are crucial elements in the policy. The role of interdisciplinary research in improving policy regarding disaster risk management should not be ignored or delayed.

As the previous chapter of this thesis explained, there is a good level of required policy planning for Bangladesh, but the challenges lie in policy implementation. For example, the ministries need to build expertise to implement policy at the local level. Who does what and how, and who is responsible for reporting and monitoring? In other words, policy plumbing needs to be in place. In addition, funding is required for conducting research at the local level. The local, regional and national authorities need to set up the report and monitor cells within their capacity to implement the decentralised policy discussed already in the discussion chapter. This research informs policymakers and policy practitioners and suggests future research on human-place relationships in at-risk places to manage climate change's immediate and longer-term impacts. Attitude towards non-migration despite the increasing number of at-risk places is a part of the general problem. Therefore, affected countries and people are in similar situations and face similar policy challenges. This study contributes to coming out of those policy constraints from this approach.

7.7 Opportunities for further research

The findings from this thesis only present a basic analytical concept about how human-place relationships are in the context of increasing environmental stress (Figure 5.1). However, this thesis suggests various opportunities for further research, which can be very useful in managing the affected households' migratory and non-migratory

behaviour. The four dimensions which comprise the place relations and the interlinkage among the dimensions are still a great deal to explore. The extent to which the components of place obduracy, i.e., place dependence, is linked with livelihood opportunities is still unknown. Moreover, the extent to which the component of social-structural constraints, i.e., poor governance, is linked with environmental risk perception is still unknown. Additionally, how each component of every dimension plays a role in determining non-migratory decisions is also unknown. Also, with increasing risks, how each component of a voluntary relationship reaches its threshold and turns into a forced relationship is still unknown.

It is crucial to find out what is behind these non-migration attitudes in which these households are forced to migrate. If this pattern of non-migration attitude were repeated in a similar study, it would enable targeted research and, eventually, policy. It might also be useful to investigate whether the human-place relationship pattern identified in this study and households from somewhere else in a similar context share the same pattern in human-place relationships. A more refined version of the concept could then be useful to understand the migratory behaviour of the households at risk more structurally.

Further investigation will be useful to investigate whether there is any correlation among the dimensions. The dimensions of place relations help identifying the drivers of environmental migration. However, understanding how much each driver contributes to migratory decision making and at what point in the process is still a crucial research area to understand the threshold of adaptive capacity. To more accurately parameterise a conceptual model, this study can help understand the probabilities of how many affected households will make a certain type of migratory decision. This could possibly be achieved by extending to a larger population and designing a survey using a Q study. Such a survey has been used previously to assess driving factors and the nature of a particular phenomenon which helps to understand the decision-making process.

Further research with interviews and thematic analysis represent exciting opportunities for methodological development. The same methodological approach could be used to explore migratory and non-migratory attitudes in a similar context, but somewhere else,

in this way, it would be possible to validate the place relations of another at-risk area. It is also possible that the methods could be used to investigate areas with different hazard profiles. Although there are commonalities in the hazard profile, the issue for each community will vary depending on their socio-economic and cultural characteristics. The innovative ways of questionnaire design could be replicated. If semi-structured interviews were applied to other high-at-risk areas, they would need to be adapted to the particular characteristics of the hazard profile of that area and their asset profile in the questions. Constructing the question to reflect the participants' livelihoods, culture, and economic conditions would be necessary.

The most significant consequences of gradual-onset disasters are yet to materialise. An average individual does not think that far ahead, and politicians do not operate in that time scale either. This thesis challenges existing understandings of environmental migration, which still tend to focus place relations around the sudden onset of disasters. It also challenges that attitudes towards migration and non-migration are not either one or the other for households; in some cases, both more or less exist simultaneously. Therefore, this researcher has shown the importance of a more structural approach in understanding how to place relations function in at-risk conditions. The successful integration of the methods and research framework for this thesis suggests that other theories on human-place relationships in normal environmental conditions are not adequate in explaining increasing stressful conditions.

This thesis would be useful for further studies to implement other methods to investigate human-place relationships in at-risk areas to explore how the place relations are formed. As discussed in the methodological chapter, it is likely that such methods would initially be qualitative to get a deeper understanding of the root causes which are linked to migration and non-migration behaviour. This qualitative study suggests a diverse range of reasons which cause place obduracy despite slow-onset environmental disasters. As this study is context-specific, it is unlikely that households in a different area would be completely identical as defined by their factors interpretations for Kalapara. However, some of their key characteristics are likely in other communities. Non-migratory decisions in any at-risk places probably include a lack of trust in their local authorities,

the difference between actual and perceived risks, and dependency on certain livelihoods. It would therefore be useful to investigate further the dimensions and their components of human-place relationships in other at-risk areas.

There has been a surge in academic interest in the role of environmental science communication using social media platforms. In this regard, there is clearly room for research, i.e., a framework for communicating disaster risks, including an impact-based early warning system, would help at-risk households minimise their loss and damage and enhance their adaptive capacity (Ahsan et al., 2020). There have been experiments on using social networking platforms for risk communications, but further research in migratory decision-making will benefit from further research. This thesis has shown that interview, and thematic analysis can be used to conceptualise the role of place relations, and the method could also be used to identify social-psychological attitudes.

To develop a more accurate conceptual model for making projections, it will be necessary to empirically investigate how the components of place relations function with each other. Recent research on the drivers of non-migration attitudes and how they are interrelated to each other, along with how they are correlated with disaster risks, will be very useful. The components of place relations suggest that small adjustments in the proportions of each component of place relations can lead to large differences in non-migratory decisions. Further research can attempt to identify how these changes in attitude are better understood. For example, understanding how much one of the components of environmental risk perception changes each year and whether that change contributes to the overall human-place relationship can help the scientist to project the nature of displacement. It would be useful for policymakers to investigate how such a change in attitude could be included in the policy practices, as discussed in the previous chapter.

The dimensions of place relations reveal that livelihood opportunities also impacted to increase in the voluntary relationship with, Kalapara, the at-risk place. There needs to be further research on how an increase in alternative livelihood opportunities, i.e., in the tourism sector, can facilitate the household to enhance their adaptive capacities through alternative livelihood outcomes and how much it is keeping them in such a

place of increasing environmental risk. Innovative and multidisciplinary methods need to be deployed in exploring such complex behaviour.

7.8 Conclusion

The fundamental message from this research is that four interconnected dimensions of place relations help us to explain the transformation of non-migratory behaviour under increasing environmental stress. The concept highlights that adaptive capacity does not determine only by livelihood opportunities. We must pay closer attention to each dimension of place relations to better understand adaptive capacity. Livelihood opportunities may decline under increasing environmental stress, but place obduracy might still be assertive and non-migratory behaviour might not change. Similarly, if people are not aware of the risks and cannot associate the risks with vulnerabilities, non-migratory behaviour is less likely to change. Moreover, disaster risk reduction and governing managed retreats may become impossible if social-structural constraints add up with existing vulnerabilities.

This thesis represents a fundamental challenge to positivist and people-centred policy approaches and clearly demonstrates the value of understanding human-place relationships in at-risk areas to manage large-scale displacements better. Traditional tools such as interviews and thematic analysis have a significant role to play in investigating migratory and non-migratory decisions. Development and displacement policies can only benefit from incorporating findings from such studies to make the development climate-smart and sustainable for longer and better adaptive capacity, health and wellbeing.

There are places in Bangladesh where gradual-onset disasters are already hitting hard. As the gradual-onset of disasters slowly manifest through the loss and damage of lives, livelihoods and well-being of affected households, it is difficult to isolate the drivers from the changes in the environment and social, economic and political conditions. Especially in the context of Bangladesh, where the availability of data on almost every driver is either a bare minimum or an absolute absence, further research is crucial to

building a valid model that can successfully project migratory and non-migratory behaviour. Meanwhile, the number of households living in areas threatened by sudden, gradual-onset disasters is increasing. If mass displacement, conflicts, and social and environmental catastrophe are to be avoided, there is a need for more effective policies.

This thesis has shown that innovative methods can be used to study human-place relations at the household level. The study facilitated the investigation of households' choices to remain based on an understanding of participants' socio-economic-psychological context and responses to Nicolosi and Corbett, 2018 call for more research on complex, multi-dimensional relationships with place. This study was an ideal starting point for synthesising the multi-dimensionality of human-place relationships of a place at risk. As such, it demonstrated the potential of this method for investigating migratory and non-migration decision-making.

The special reports, working group reports, summaries for policymakers and technical summaries, synthesis reports, and many special reports of IPPCC have been incredibly important in providing the underlying scientific knowledge for understanding the climate system, how it is changing and how humans are becoming vulnerable (IPCC PSB AR6, 2021). This scientific knowledge also identifies vulnerability as the precursor that determines impacts and is closely associated with adaptive capacity. The question is to what extent countries like Bangladesh have been able to absorb the reality of the IPCC's messages in their policymaking. However, by the time the country learns to implement the policy, many households in Kalapara and many other climate hotspots in Bangladesh face the closure of the window of opportunity. Clearly, the IPCC literature is not helping to bridge either the emission gap or the gap between science and local-level policy practices, especially for developing countries like Bangladesh. The reality on the ground of many small island states is that their current vulnerability and future are not secure. There is a need to rethink the science and policy processes – how loss and damage are felt by the people in Kalapara, assessed by the IPCC and how the parties' cooperation (COPs) is producing is not just. The consequences are mounting as most households are less likely to change their non-migratory behaviour in many countries like Bangladesh.

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