CLIMATE CHANGE ADAPTATION IN BANGLADESH: SEN'S CAPABILITY APPROACH AND THE ROLE OF FREEDOM OF CHOICE

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by

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To my beloved family
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CHAPTER-1: INTRODUCTION TO THE THESIS

1.1 Introduction

Climate change is progressing. Its adverse impacts undermine lives and livelihoods worldwide, and its uneven geography raises a question of justice. This thesis is based on the assessment of ‘the Capability Approach’, a normative framework developed by Amartya Sen and further examined by several others, namely Martha Nussbaum, Fukuda-Parr, Sabine Alkire and Ingrid Robeyns, which has gained momentum in capability-related research and learning for human well-being, social, economic, environmental and cultural opportunity as social justice, freedom, equality and quality of life (Alexander, 2008; Deneulin & Shahani, 2009; Kundal, 2020; Robeyns, 2017). It helps to understand human well-being as a multidimensional phenomenon that cannot be captured by a single indicator such as income (Gough, 2014; Leßmann, 2012; Oosterlaken, 2015; Robeyns, 2017). Adopting and implementing the capability approach has the potential to apprehend the social, economic and environmental dimensions of the lives and livelihoods of vulnerable populations in a country like Bangladesh and to act accordingly.

Recent global scientific assessments indicate high levels of certainty that climate change is already occurring, partly due to anthropogenic pressure, and that adverse impacts are unavoidable over the coming decades (Conde et al., 2012; Intergovernmental Panel on Climate Change, 2014b, 2022; Younus, 2014). These impacts will disproportionately affect regions of the world whose populations are both individually (per capita) and collectively least responsible for contributing to rising emissions levels (Watch, 2020) and least able to deal with the consequences (Conde et al., 2012; Intergovernmental Panel on Climate Change, 2014b, 2022). Bangladesh is one of the most climate-vulnerable countries in the world (Assaduzzaman et al., 2023; M. M. Khan, 2022; Momtaz & Shameem, 2015; Younus, 2014). It is recognized as a vulnerable ‘hotspot’ for adverse climate change impacts, too, due to its low-lying geography and population density (Ha-Mim et al., 2020; M. R. Khan et al., 2021; Mudasser et al., 2020; M. N. I. Sarker et al., 2021). Bangladesh has always been a disaster-prone country, even before climate change accelerated disaster severity and frequency of occurrence. Tropical cyclones and floods (both seasonal and flash floods) are the major natural disasters, including tidal inundation, droughts and earthquakes. According to the World Bank (World Bank, 2013), “sixty per cent of the worldwide deaths caused by cyclones in the last 20 years occurred in Bangladesh”. Moreover, Bangladesh is a nation of water. Over 20% of the entire country is submerged beneath river floods in an average year; in 1988, 67%
of the country was covered by river floodwaters (Abbott, 2011). About five cyclones per year enter the Bay of Bengal both before (April–May) and after (October–November) the southwest monsoon season (Abbott, 2011; M. N. I. Sarker et al., 2021). About 28% of the total population of Bangladesh live in the coastal areas. Coastal communities in Bangladesh have been facing environmental challenges for centuries (Lein, 2000; Paul & Ramekar, 2018). Yet, the future adverse impacts are unprecedented: it is estimated that more than one million people will be affected by sea-level rise in 2050 in each of the Ganges-Brahmaputra delta areas in Bangladesh (E. Alam et al., 2018; Groupe d’experts intergouvernemental sur l’évolution du climat. Working Group II. & Intergovernmental Panel on Climate Change, 2007; Younus, 2014). At the same time, the population of Bangladesh is projected to almost double in the next 30 years, forcing a million or more people to be vulnerable to frequent cyclones (Planning Commission, Ministry of Planning and Asian Development Bank, 2021).

![Figure 1.1: A Climate Hazards Calendar of Bangladesh (Climate Change Cell, Department of Environment, 2007)](image)

The climate change literature asserts that poor people in lower-income countries are especially vulnerable to climate impacts because (i) they live in geographically more exposed and marginal regions; (ii) their livelihoods often depend on natural resources and are thus more sensitive to changes in climate and extreme weather events, and (iii) they possess limited assets to mobilize towards coping with impacts in the present and for investing in longer-term adaptation (Adejuwon et al., 2012; S. Ahmed & Eklund, 2021; Neil Adger et al., 2009; Talukder et al., 2016). As a result, it is widely believed that poverty and vulnerability to climate change are closely linked, and Africa and Asia – with the highest concentrations and most severe levels of chronic poverty – are identified as two continents that are particularly vulnerable to climate change impacts (Scott et al., 2012). Considering the potential impacts of climate change, it is clear that the most vulnerable groups within each community are the poorest amongst them, and even within the poor groups, the most vulnerable are the women, children, elderly and the sick. It is, therefore, quite likely that climate change impacts will fall disproportionately on vulnerable groups within the country.
2015; Nasreen et al., 2023; Sajjad et al., 2022). Nonetheless, internal climate change-related migration in Bangladesh is increasing due to climatic hazards, and around 13.3 million people in Bangladesh could displace by 2015 (Rigaud et al., 2018).
Table 1.1: Coastal zones in Bangladesh affected by tropical cyclones (Wikimedia Foundation, Inc., 2023) (source: https://en.wikipedia.org/wiki/List_of_Bangladesh_tropical_cyclones)

<table>
<thead>
<tr>
<th>Cyclones</th>
<th>Wind Speed (km/h)</th>
<th>Deaths</th>
<th>Damages (Million US$)</th>
</tr>
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<tr>
<td>Bhola Cyclone-1970</td>
<td>205</td>
<td>500,000</td>
<td>86.4</td>
</tr>
<tr>
<td>Bangladesh Cyclone-1991</td>
<td>260</td>
<td>138000</td>
<td>1500</td>
</tr>
<tr>
<td>Sidr-2007</td>
<td>260</td>
<td>4036</td>
<td>1700</td>
</tr>
<tr>
<td>Nargis-2008</td>
<td>215</td>
<td>126</td>
<td>10,000</td>
</tr>
<tr>
<td>Aila-2009</td>
<td>120</td>
<td>26</td>
<td>552.6</td>
</tr>
<tr>
<td>Mahasen (Viyaru)- 2013</td>
<td>95</td>
<td>17</td>
<td>514</td>
</tr>
<tr>
<td>Komen- 2015</td>
<td>70-90</td>
<td>7</td>
<td>200</td>
</tr>
<tr>
<td>Roanu-2016</td>
<td>85-110</td>
<td>135</td>
<td>213</td>
</tr>
<tr>
<td>Matmo-Bulbul- 2019</td>
<td>85</td>
<td>43</td>
<td>3200</td>
</tr>
<tr>
<td>Cyclone Fani</td>
<td>215-280</td>
<td>89</td>
<td>8100</td>
</tr>
<tr>
<td>Cyclone Amphan 2020</td>
<td>240-270</td>
<td>128</td>
<td>1370</td>
</tr>
<tr>
<td>Cyclone Yaas 2021</td>
<td>120-140</td>
<td>20</td>
<td>284</td>
</tr>
<tr>
<td>Cyclone Sitrang 2022</td>
<td>85</td>
<td>35</td>
<td>Unknown</td>
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</table>
Figure 1.2: Cyclones typically move up the Bay of Bengal into Bangladesh (Abbott, 2011)

This PhD thesis aims to provide a valuable and significant contribution to the academic knowledge and understanding of development based on a case study of the coastal areas of Bangladesh considering climatic hazards, lives and livelihoods of the coastal population. It is hoped that this research will also help formulate policies for sustainable development and human well-being with equal rights and opportunities for all those affected by the impacts of climate change.

1.2 Amartya Sen's capability approach (CA) to Deal with climate change and human development in Bangladesh

In contrast with GDP growth measures, the Capability Approach developed by Amartya Sen has significantly contributed to developing alternatives for development and welfare measurement and policy analysis. (P. Anand et al., 2009; Kuklys, 2005b; Mizohata, 2011). The capabilities refer to genuine freedoms that enable one to lead a life one has reason to value” (Amartya Sen, 2001a), and a person is free to make decisions about what kind of a life to lead” (Amartya Sen & Dreze, 1999). Freedom is a primary property of human beings as agents of confronting the physical world. A person’s capability is usually defined concerning their ability to function and reflects what s/he can do or be within a particular context (Amartya Sen, 1999). When the human being is accessible in a positive way, he can do what he wants.(Jasek-Rysdahl, 2001) And in many aspects, Sen focuses on the good side of freedom (Qizilbash,
In this study, the various factors affecting an individual's freedom, which matter the conversion of opportunities as per individual circumstances, will be investigated. They are, for instance, social, economic and political discrimination, personal disability, and environmental and geophysical constraints. Individual capabilities depend on resources and valuable activities within different contexts (Byskov, 2018; Venkatapuram, 2013; Wigley & Akkoyunlu-Wigley, 2006). Reinforcing capabilities increases individuals' possibilities to choose, making it easier to choose the life they want (Ballet et al., 2013). According to (Adger et al., 2009), individual factors are among several other parameters (individual, social, political, environmental) that limit climate change adaptation. In this research, we analyze the individual capabilities and conversion factors to assess the achieved functionings for overall well-being.

Bangladesh has been practicing development approaches to enable vulnerable local populations to identify and implement appropriate community-based measures by themselves to respond to the impacts of climate change and disaster risks (Abedin et al., 2014; Habiba et al., 2013; Reid et al., 2009; Shaw, 2012). Institutional governance and arrangements at all levels are critical. For example, women may not benefit from community-led initiatives unless inclusive (local and informal/formal) institutional structures are designed that consider both genders' specific and often different needs, roles, and responsibilities. Only then do men and women at the community level become agents of change and increase their ability to adapt to climate change. In this process, success depends on transparency in decision-making and sharing benefits equally (Marlene Roy & Henry David Venema, 2002). One observation obtained from the field is that many women have little or no involvement, specific information and awareness about the projects/programs for particular areas launched by the government or non-government organizations. This is one kind of deprivation from being engaged or participating in community welfare activities.

This thesis grounds Amartya Sen’s capability framework to guide the methodological approach (Burchardt & Hick, 2018; Amartya Sen, 1995, 2001a). Sen used the capability approach in the policy-oriented context and for articulating the Human Development Index (HDI) (S. Anand & Sen, 2000; Deneulin & Shahani, 2009; Fukuda-Parr & Shiva Kumar, 2004; Robeyns, 2017). In development circles, the capability approach has provided foundations for the human development paradigm (Fukuda-Parr, 2013, 2017; Fukuda-Parr & Shiva Kumar, 2004) that regards human development as a process of enlarging people's freedom of choices (Cornia & Stewart, 2014). This study describes the capability approach through fundamental concepts such as well-being, functionings, capabilities, freedom of choice, individual choice, and effects of matter conversion factors. The capability approach is also widely used in applied and empirical studies; and the development of policy by government and non-government
organizations in developing countries (Cornia & Stewart, 2014; Elson et al., 2014; Fukuda-Parr, 2017).

We address the issue of poor people’s responses to ecological and climate variability by using the broad normative framework of the capability approach (Robeyns, 2017, 2003b) to understand the role of individual freedom of choice in enhancing personal well-being. The capability approach also interacts with environmental, social and economic dimensions for well-being. The most common use of the capability approach is to measure human well-being by expanding people’s agency freedom (Bavetta et al., 2014; M. Biggeri & Ferrannini, 2014).

There are several governments and non-governments (NGOs) and community-based organizations (CBOs) implementing adaptation programs for the people living in the coastal areas of Bangladesh (Gacusana, 2009; Monwar et al., 2018; Reid et al., 2009). This capability approach will contribute to the shortcomings and gaps in knowledge by providing a framework that considers people’s participation in determining people’s well-being. The proposed framework is based on the central research question and sub-questions, which form the thesis chapters. Individual chapters will describe the specific methodology for investigating the relevant research question.

The thesis explores the capability approach framework by using it for assessing adaptation, risk reduction, livelihoods and individual well-being related to climate change migration and adaptation decision-making in line with the freedom of choice. No ready-made theory can smoothly be applied to these recent climate change and socio-economic phenomena. Still, this capability approach framework can guide empirical research on these bounded issues.
Figure 1.3: General scheme describing the impacts of conversion factors on freedom of choice and achieved functionings considering a pro-poor response to climate change included in the central research question, Adopted from (Mink et al., 2015).
1.3 Case study area: South-West coastal region of Bangladesh

The study was conducted in Khulna, Satkhira and Bagerhat districts in the southwestern coastal regions of Bangladesh, which have a population of 6.2 million (Abedin & Shaw, 2013). The selected study areas are six unions (local government unit) from Shyamnagar upazila (sub-district) in Satkhira district, two unions from Dacope upazila in Khulna districts and one union (union comprised of a few villages) from each of the Mongla and Rampal upazila in Bagerhat district. The study locations are adjacent to the Sundarbans (the world’s largest mangrove forest) and the Bay of Bengal in the south and the west Bengal of India. The southwest of Bangladesh’s coastal areas is one of Bangladesh’s most vulnerable areas due to natural disasters and climate change impacts, and also one of the six geographic “hotspots” (mentioned in the Bangladesh Delta Plan 2100), considering natural hazards and climate change risks.

![Coastal zone map of Bangladesh with the study areas](image)

**Figure 1.4**: Coastal zone map of Bangladesh with the study areas (blue)

1.4 Thesis Aim and research questions

Adapting to its adverse consequences becomes central in the face of climate change. Understanding the extent of an individual’s capability to adapt to climate change plays a vital role in assessing the effectiveness of the adaptation options in the context of any adaptation program. Following Sen’s CA framework, opportunities and individual freedoms on human well-being are essential to this thesis. It explores whether the components of the capability approach affect an
individual's well-being. In the thesis, ‘securing human freedoms’ is the expansion of opportunities for better functioning (being and doing) for individuals to lead the life they value (for their well-being).

This PhD research explores how individual capabilities (in the sense of Sen) relate to poor people’s (decision-making) ability to switch livelihoods in response to climate variability. This empirical work in the thesis investigates individual capabilities and the freedom of choice across different socio-economic groups under several climate change stressors on livelihoods, health, agriculture, and water resources at the family and community levels. Beyond their academic value, these findings may contribute to the ongoing practical discourse on climatic risk, hazards, vulnerability and adaptation to climate change at local and regional levels.

To meet the primary research objective, the following research questions (RQ) are developed:

RQ1: How does freedom of choice differ based on gender and ethnicity?

RQ2: How may gender & ethnicity interact with each other under the adverse consequences of climate change, and are particular social groups, which initially reside in similar geophysical conditions, trapped in an unfavourable environment?

RQ3: How do pull and push migration factors differ among various socio-economic groups?

RQ4: Where is the border between migration as an adaptation option and forced migration?

RQ5: How does the well-being of permanent migrants compare to the well-being of non-migrants?

RQ6: How does the migration decision affect the well-being of the migrant group?

1.5 Significance of the Research

Bangladesh has been trying to mainstream climate change adaptation in different sectors (agriculture, water resources management, health, water sanitation, biodiversity conservation etc.) to reduce the adverse impacts of climate change on lives and livelihoods and also for climate resilient development in the country. Bangladesh has made creditable efforts to streamline regulatory and institutional settings to achieve climate-resilient sustainable growth by developing required climate-related policies, strategies and regulatory frameworks over the years. The climate change initiatives of Bangladesh to achieve climate resilience are as follows (source: authors collected the information from national institutions)
• Bangladesh has its climate change strategy and action plan (BCCSAP), 2009
• National Adaptation Plan 2022
• National Adaptation Programme of Action (NAPA), Bangladesh 2005, updated in 2009
• Bangladesh Climate Change Trust Act, 2010
• Nationally Determined Contributions (NDC), 2015, enhanced and updated in 2021
• NDC implementation roadmap, 2018
• Bangladesh Delta Plan, 2100
• Mujib Climate Prosperity Plan 2030 (draft)
• National disaster management policy, 2015
• Standing Orders of Disasters (SOD) 2019
• National Strategy on Internal Displacement Management 2021-2025
• Bangladesh Energy Efficiency and Conservation Master Plan up to 2030
• Renewable Energy Policy of Bangladesh, 2008
• Bangladesh National Action Plan for Reducing SLCPs, 2012, updated in 2018

This PhD research will review these national policy, strategy and planning documents. In addition, this research will help find possible solutions for reducing coastal people's vulnerability and enhancing human well-being. The study can also contribute to mainstreaming gender and ethnicity issues in climate change policy in line with government efforts to address gender-based implications of current and future climate change.

1.6 Outline of the thesis

The first three chapters set the theoretical and methodological scene for the empirical research chapters with an introduction, description of the theoretical framework and overview of the methodological approach (Chapters 1-3). The thesis contains three central empirical research chapters to answer the overarching research aim and specified research question (Chapters 4-6). The thesis concludes with a chapter (Chapter 7), references, and appendices. Figure 1.3 illustrates the thesis structure and links between the individual chapters.
Chapter 1
Introduction

Chapter 2
Theoretical Framework (Theoretical Underpinning and Gaps in Knowledge)

Chapter 3
Research Methodology

Chapter 4
Gender-Ethnicity Intersectionality in Climate Change Adaptation in the Coastal Areas of Bangladesh

Chapter 5
Freedom of Choice to Migrate: Adaptation to Climate Change in Bangladesh

Chapter 6
Climate Change Migration and Freedom of Livelihood Choice

Chapter 7
Conclusions and Recommendations

Key Question
how do individual capabilities (in the sense of Sen) relate to the ability of poor and vulnerable people to engage in livelihood well-being in response to ecological and climate variability in the coastal areas of Bangladesh?

Figure 1.5: The structure of the thesis and chapter linkage
1.7 References of Chapter 1


CHAPTER-2: THEORETICAL FRAMEWORK

Theoretical Underpinning and Gaps in Knowledge in Climate Change Adaptation in Bangladesh

2.1 Abstract:

The article describes the intensifying vulnerability to climate change and related disasters in light of the need for a capability approach (CA) as a ‘people-centred’ approach (Garibaldo, 2011; Krishnakumar & Nogales, 2015; Lepeley, 2019; Pfannstiel, 2023). The CA underlines a person’s ability and links access to resources and welfare, pursues what a person can do with his/her opportunity, and can institute protective actions in the face of climatic hazards. Individual’s freedom to choose a type of life to lead and for his/her well-being depend on all beings and doings as functionings (Sabina Alkire, 2005; Kundal, 2020; Robeyns, 2003a, 2017; Amartya Sen, 2001a). It is also vital to have the freedom to enjoy different ways of living to reduce individual vulnerability to natural hazards due to climate change (Assaduzzaman et al., 2020, 2023; Crabtree, 2020; Narang, 2017). The central query of the paper is to what extent does people’s adaptive capacity to climate change depend on people’s freedoms (basic capabilities)? There are extensive kinds of literature on the capability approach. Still, this paper generally focused on the types of literature relevant to an individual’s ability to adapt to climate change for human well-being following ‘the basic capabilities’ and ‘fundamental elements of individual well-being’, which also contributes to an adaptation process in the coastal areas of Bangladesh. Ecological security includes sub-capabilities so that one can be able to reduce his/her vulnerability to natural hazards and have a self-decision-making strategy and freedom of choice to environmental and climate variability (S. Ahmed & Eklund, 2021; Ranjan et al., 2023; Sajjad et al., 2022).

Keywords: Climate change adaptation, vulnerability, freedom of choice, basic capabilities, human well-being

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1 This chapter prepared as article and going to be submitted to the Journal of Human Development and Capabilities (a peer-reviewed Routledge academic journal focused on human development and capability approach)
2.2 The Capability Approach and Adaptation to Climate Change

This article examines the issue of an individual's ability to adapt to climate change against the background of the so-called Capability Approach (CA). Capability is a normative approach to human welfare that focuses on the actual capability of persons to achieve their well-being (Ana, 2015; Kundal, 2020; Robeyns, 2003a). The core focus of the capability approach on what individuals can do (i.e., capable of) is critical for decisions on individual climate adaptation and migration choices. (CA) is essentially a ‘people-centred’ approach, which puts human agency (rather than organizations such as markets or governments) at the centre of the stage (Drèze & Sen, 2002). The CA works in various fields as a broad normative framework assessing individual well-being in designing and evaluating policies (Ana, 2015; Apsan Frediani et al., 2014; Robeyns, 2005). It is used prominently in development economics, social arrangements, social changes and political philosophy. It is also used as a theoretical framework for the human development paradigm with the implication in applied and empirical studies in environmental and social sciences. Here we explore the significance of the capability approach for adaptation to climate change and human well-being in the coastal areas of Bangladesh.

2.2.1 Climate Change Adaptation As A Capability Problem

Climate change is one of the significant challenges in Bangladesh, affecting people’s lives and livelihoods. As a disaster-prone country, people in Bangladesh become highly vulnerable to climate change. Among them, the poor and the marginalized, people living in the coastal areas, women, children, ethnic minorities and people living with disability are comparatively more vulnerable than others). There are some individual, family and community-based adaptation initiatives at local and regional levels in Bangladesh, considering Bangladesh Climate Change Strategy and Action Plan (A. Islam et al., 2013a) and National Adaptation Programme of Action (M. Alam et al., 2013; A. Islam et al., 2013b). The adaptation process is not very simple and inclusive, and climate change can potentially disrupt the development process and increase inequalities in human well-being (Neil Adger et al., 2006). Poor and landless people have limited resources and ability to respond to ecological and climate variability in terms of livelihoods, displacement, diseases and deaths (S. Ahmed & Eklund, 2021; Ha-Mim et al., 2020; M. Khan, 2015; Neil Adger et al., 2006; Ranjan et al., 2023). Participation in the adaptation planning and processes for the poor and the marginalized is limited and almost excluded from access to the adaptation outcome generated (Ahsan et al., 2021; Shaw et al., 2013). We will also use “coping and adaptation” to climate change instead of “response” to ecological and climate variability in the ongoing discussions.
In Bangladesh, 31.5% of the total population was living below the national poverty line in 2010 and 24.3% in 2016 (Aziz, 2020), and this is an understanding that raising the per capita income is essential for the poor people in Bangladesh. There is no doubt that increasing income is the primary and singular focus for economic development, but Sen (Amartya Sen, 1999) focused on poverty as an unfreedoms which includes not only the economic factors but with many non-economic factors, which affect poor people’s lives and the livelihoods, environmental degradations and coping and adaptation to climate change. Duraippah (A. K. Duraiappah, 2003; Anantha K. Duraiappah, 2004) also claimed that environmental deterioration is an important cause of unfreedoms that disproportionately affect the poor and the marginalized. But we will try to figure out that “effective freedoms depend partly on a person’s capacities built up through his/her efforts so that lack of capability (of the poor people) doesn’t necessarily establish a claim against others” (Comim et al., 2008; Qizilbash, 1996). To respond to a developing country's climate and environmental variations, Bangladesh needs to reduce emissions to prevent irreversible climate change and limit the impact on the lives and livelihoods of the country's vulnerable people. Actions (coping, adaptation or mitigation, finance) to be taken regarding the environment, economy and infrastructures at the regional and national levels to address climate change and environmental degradation. The UNFCCC (UNFCCC. Secretariat, 2022) urges developing countries to prioritize climate change adaptation due to their higher vulnerabilities. A poor or pro-poor response to climate change and environmental variations is more important in low- and middle-income nations than high-income countries (Moser & Satterthwaite, 2008). As a developing and lower-middle-income nation, Bangladesh has no difference and also has the urge to go for pro-poor adaptation to climate change and environmental variability. Bangladesh has prioritized and been practising climate change adaptation to reduce vulnerability and risk of climate change impacts (Filho, 2017; S. Huq et al., 2019; Nasreen et al., 2023; Shaw et al., 2013).
2.2.2 The Capability Approach

In the Capability Approach, Sen views development as an expansion of the capabilities, which is also the starting point in the human development approach (M. Biggeri & Ferrannini, 2014; Mario Biggeri & Ferrannini, 2014; Qizilbash, 1996; Amartya Sen, 2001b). According to Sen (Amartya Sen, 2001b), human development is seen as the expansion and the achievements of what a person can be or do. For example, to be healthy, knowledgeable, well-nourished, and participate in social and community life. From another viewpoint, these can be seen as a person's freedoms that remove obstacles to a person's ability to choose or do necessary things which he/she values in his/her life. Obstacles such as illiteracy, ill health, lack of access to resources, or lack of civil or political freedoms reduce individual capabilities (Fukuda-Parr, 2013; Fukuda-Parr & Shiva Kumar, 2004). The capability approach is also a ‘more general’ approach to the problems that economics and development studies address. However, it has a distinct value apart from the practical contributions and empirical work in methods (Sabina Alkire, 2005). At the same time, the capability approach is not limited to this. It has particular strengths regarding clarity about the meaning of justice and freedom that deprived people have enjoyed valuable being and doings (Amartya Sen, 1995, 2001a).

There are extensive kinds of literature on the capability approach, and here we focus primarily on Sen’s work and the relevant work of his followers (Sabina Alkire, 2005, 2007, 2015; Sabina Alkire & Deneulin, 2009; Elson et al., 2014; Fukuda-Parr, 2003, 2013; Robeyns, 2003a, 2005, 2017) focusing on people’s capability and well-being. My particular aim is to analyze poor people’s responses to the contemporary and projected environmental and climate variability and changes in the southwest coastal zones of Bangladesh, focusing on adaptation and sustainable development for human well-being through the lens of the capability approach.

2.2.3 Application of the Capability Approach in Climate Change Adaptation

“Capability reflects a person’s freedom to choose between different ways of living—the underlying motivation—the focusing on space (Amartya Sen, 1990). The research tries to analyze individual perspectives in line with the conversion factors and the circumstances in the view of CA. We are here applying Sen’s framework, which is flexible and exhibits a considerable degree of internal pluralism, and there is scope to use this in many different ways (Sabina Alkire, 2003; David A. Clark, 2005; David Alexander Clark et al., 2019) and further Sen (Amartya Sen, 1999)
indicates that the Capability approach can be used to assess individual advantage in a range of different spaces. According to Sen (Archard & Sen, 1995; Amartya Sen, 1995), The Capability Approach complements the information space for assessing evaluations by recognizing that human well-being is a multidisciplinary phenomenon.

For example, assessing poverty might involve constructing a relatively small subset of essential capabilities. On the other hand, evaluating human well-being or development seems to require a much longer and more diverse list of faculty (David Alexander Clark et al., 2019; Amartya Sen, 1990). We shall not evaluate human well-being here; instead, we try to assess the individual capability set to achieve functionings that also impact human well-being. Crocker (Crocker, 1992, 2008) also highlighted its achieved functionings and said that “A person’s well-being is not a matter of how rich he or she is but rather by the capability to achieved functionings”.

In the capabilities approach literature (Apsan Frediani et al., 2014; Mario Biggeri & Ferrannini, 2014; Crabtree, 2020; Fukuda-Parr, 2003; Qizilbash, 1996), development is understood as the expansion of the capabilities and the process of realizing basic capabilities and poverty is understood as the deprivation of the primary or elementary of capabilities to live a good life (Amartya Sen, 2010). The capability approaches focus mainly on the quality of life individuals can achieve, which is evaluated by the core concept of ‘capability’ and ‘functionings’ (A. Sen, 1993). Therefore, measurement of the basic capabilities is crucial to see individuals’ well-being, economic development, and social progress regarding individual and collective actions. Robeyns (Robeyns, 2003a) also argues for the selection of capabilities considering the particular purposes, and this will follow the capabilities for the general framework of evaluation of the individual capability and well-being. Also, shed light on operationalizing Sen’s capability approach from theoretical concepts to the implication of human well-being perspectives.

This said, how should the adaptation and the individual well-being be assessed using Sen’s capability approach? Since the capability and functionings should determine well-being, adaptation to ecological and climate variability and changes should also be seen as an expansion of the basic capabilities with the understanding of the adaptation process realizing the basic capabilities. In other words, the question should be: to what extent does people’s adaptive capacity to climate change depend on people’s freedoms (basic capabilities)?

However, we must answer ‘What are the basic capabilities’ before investigating how basic capabilities contribute to an adaptation process. Though most developing countries, like Bangladesh, have not yet endorsed and safeguarded their citizens to choose their basic
capabilities, it is of high importance, and it is familiar to all citizens of a country irrespectively of their location. For example, the capabilities of being adequately nourished and educated, being healthy (at least avoiding preventable morbidity), participating in community life without fear and appearing in public with dignity. Thus, the individual capabilities of the poor people living in the coastal areas related to adaptation to climate change will mainly focus on the climate change impact on the lives and livelihoods of the coastal people and the existing adaptation measures. Furthermore, the effects on health, education and empowerment are reviewed with the available information and the empirical study done in the context.

2.3 The Capability Approach and Individual Freedoms

The capability approach focuses on the individual freedom to make choices (Amartya Sen, 1985, 2001a). Therefore, Sens’s capability approach can be defined as effective freedom. It also encompasses an individual's choice in selecting alternatives for his/her well-being that s/he has reason to value. Development studies, in particular the ones guiding development policy, also consider the expansion of freedoms so that the 'non-freedoms' that leave people with little choice can be eliminated. In his book “Development as Freedom” (Amartya Sen, 2001a), Sen tells about five distinct types of freedom. Taking an ‘instrumental’ perspective, each of these particular types of rights and opportunities helps individuals advance a person’s general capability. They may also serve to complement each other.

i. Social opportunities (in the form of education and health opportunities)
ii. Economic facilities (in the state of opportunities for participation in trade and production)
iii. Political freedoms (in the form of free speech and elections)
iv. Transparency guarantees and
v. Protective security; and

These five instrumental freedoms of Sen, Duraiappah (A. K. Duraiappah, 2003; Anantha K. Duraiappah, 2004) included ‘Ecological Security’ as an essential freedom for well-being, which can address the issues of the impacts of environmental and climate variations of human well-being. Duraiappah (Anantha K. Duraiappah, 2004) further stressed that, with adequate social opportunities, individuals could effectively shape their destinies and help each other, and nonetheless, freedoms of different kinds strengthen one another.
The following sections describe the capability approach and the climate change adaptation following the fundamental elements of the individual well-being, which is assessed by the ‘freedoms that people have reason to choose and value; and (ii) individuals are considered as the subjects of development and central to promoting the human well-being as promotion of the climate change adaptation at micro-level (family and community level adaptation planning and implementation) to Meso-level (regional and national level policy and integration). These particular issues must be considered to use the capability approach as a guiding principle for climate change and development policy making.

### 2.3.1 Freedom of Choice

Sen (Amartya Sen, 2002), in his book ‘Rationality and Freedom’, explained two different aspects of freedoms; one is the opportunity aspect of freedoms, encompassing a person’s ability to do or be various things—which he terms “capability” and linked with person’s “positive freedom”. Sen also refers to this as opportunity freedom. The second aspect of freedoms covers “autonomy of choice” and “non-interference”. This aspect of freedom is related to libertarian concerns and “negative freedoms”. Sen accepts that two aspects of freedom are related, even if they are distinct. Further, Sen views the Capability approach as a way to think about justice, advantage, and development, and capability as a space for evaluation in a pluralistic account related to the first opportunity freedom aspect. Nevertheless, there are positive and negative freedoms, but one always has a reasonable way to set her/his choices or preferences for meaningful lives s/he wants.

In the Sense of the capability approach of Amartya Sen, we must value individual freedoms. But poor people vulnerable to climate change and ecological variabilities do not often complain about the limitations and disadvantages they face concerning freedom; they are mostly prevented and have significant constraints on their freedom. However, the constraints of their freedoms are the constraints to achieve their capabilities and functionings (being and doing) for well-being in life. Here, poor people should be able to decide their priorities and pursue them like the non-poor/ rich people in the community. This may involve sacrificing personal welfare (starvation) to achieve an agency goal (hazards/disaster preparedness/ adaptation planning at the community level). However, we try to establish the link between human well-being (constituents and determinants) and the poor and pro-poor response (adaptation/ coping) to the ecological and climate variability and changes in the study areas.
In most cases, poor people are seen as “problem cases” with harmful and destructive light in society. There are many problems and limitations in the lives and livelihoods of poor people in a developing country like Bangladesh. People are vulnerable due to natural hazards and ecological as well as the negative impacts of climate change. These problems are part of the lives of poor people living in the coastal areas of Bangladesh but never the whole of life. To make lives happy and satisfying as possible; and to support individual lives, it should not limit the attention to the problems, but to the real opportunities and freedoms the individuals have. In the figure 2, applying the capability approach, we target the poor individual’s functions and consider him/her an active player, responsible for their own life. S/he might have multiple valuable skills (may be invisible) to people who consider them as problem cases! In this figure, we put the poor individual in the central, who has a minimum basket of commodities with specific characteristics and perceived rights to achieve functionings (beings and doings) s/he reason to value for his/her well-being in life. However, it is not always possible to convert to the functioning. Concerning the figure, some adaptation practices are available in the study areas. Still, those are not always effective at the individual level because of the physical, social and environmental influences, which are indeed the barrier to freedom. Therefore, the hypothesis is to strengthen the individual ability to enhance adaptive capacity can promote socially-just and equitable economic and political systems to
address the ecological and climate variability, which are the underlying causes of poverty and vulnerabilities.

According to Sen (Amartya Sen, 2001a), to achieve functionings for the poor people to respond to ecological and climate variability, the poor individual or community has to be able to remove at least some of the significant un-freedoms the individuals or the community living with. Keeping in mind that Sen (Amartya Sen, 2001a) also emphasized that “sometimes the lack of substantive freedoms relates directly to economic poverty”, which is the major obstacle to achieving the basic functionings (nourished, healthy, good clothes and shelter and related health and education facilities) and whatever freedoms they do have. Still, it is not always possible to convert to the functioning.

Sen (Amartya Sen, 2010) also argues that “different persons, for reasons of personal characteristics, or social differences or environmental influences can have widely varying opportunity to “convert” available resources (like income and wealth) into the capabilities of the respective persons-what they can or cannot do. For example, a person with a proneness to illness or living in an epidemiologically challenged environment may get far less out of a given amount of income than someone who is not similarly afflicted. The differences in individual conversion opportunities are not just a matter of special needs but reflect the general diversities in the individual human condition.

To be sensitive to capabilities is to be sensitive to what substantive freedoms a person has to do, the things that he or she may have reason to value. A capability perspective is not a thesis about how the distribution should be determined, how egalitarian, how minimalist, how efficiency-oriented and so on.
This figure outlines the core relationships between the capability approach and individual well-being through conversion factors and the freedom of choice. To explain the process, identify the capability set and achieve individual functionings, we define the goods and services one can access. A good or service has specific characteristics, which can enhance particular characteristics and the individual’s interest in specific characteristics. Afterwards, an individual may convert those into expected functionings that s/he has reason to value. For example, a bicycle cannot be a choice for people with specific disabilities because of the conversion factors needed (e.g. good health). Therefore, the relation between the characteristics of the commodities (goods and services) and the functionings to achieve certain beings and doings influence by and depend on several conversion factors, including personal, social, economic, physical (infrastructures) and environmental characteristics. Resources (such as a bicycle) are considered as input. Still, their value depends on the individual’s ability to convert them into valuable functionings (such as bicycling), which depends, for example, on their personal (physiological health), social norms, and physical environments (such as road quality). An individual’s capability
set is the set of functioning combinations to which an individual has real access. Achieved functionings are those they select. For example, an individual’s capability set may include access to different functionings related to mobility, walking, bicycling, and taking a public bus.

To answer the research question, how much does people's adaptive capacity to climate change depend on people's freedoms (basic capabilities)? We use the ability of poor people to adapt in response to climate change in the coastal areas of Bangladesh as an illustration. How do these people's capabilities (in the sense of Sen) relate to their ability to adapt?

For illustration, study areas in the southwest coastal regions of Bangladesh are taken that are highly vulnerable due to disasters and climate change and, nevertheless, of the geographical locations. There are many problems in the study areas; these are, for instance, linked to deprivation, destitution, oppression, persistent poverty, and vulnerability to natural disasters. The unfulfilled individual basic needs, lack of fundamental civil & political freedom, especially the ignorance of the interest and agency of the women, children and ethnic minority people, environmental degradation, and climate change make people’s lives and livelihoods unsustainable in many ways. Many of these deprivations are observed in one form or another in the study areas. In most cases, it is observed that the lack of substantive freedoms which are not only related to basic needs but people’s ability to convert the opportunities. Considering the cases, we will not distinguish the basic capabilities; instead, we will try to analyze the capability of poor people and their achieved functionings (beings and doings) to live the lives they value.

The following theoretical framework aims to reveal the interplay between individuals and the instrumental perspective, mainly investigated in the empirical studies that construct the relational gap for adaptation within and at the micro and meso-level for successful adaptation for a resilient family and community in the particular area.
2.3.3 Illustrating the Relation between the individual freedom of Choice and climate change adaptation

The freedom of individuals to live long and live well depends not only on economic opportunities but also on other substantive opportunities that individuals can choose for the alternatives. As we explain the reference from Sen in the previous sections, the five distinct types of freedoms are needed to exercise for human well-being. Substantive freedom (liberty of political participation or the opportunity to receive primary education or health care.) is essential for advancing the individual's capability for achieving certain functions. Therefore, selecting the capability set to achieve functionings people have reason to value is essential.

Table 2.1: Meta Capabilities, definitions and sub-capabilities

<table>
<thead>
<tr>
<th>Meta-Capabilities (MC)</th>
<th>Definition</th>
<th>Contained Sub-Capabilities</th>
</tr>
</thead>
</table>
| MC-1: Living standard (material) | Being able to participate in the growth process and being content with your status as an individual | a) Subjective well-being  
b) Economic participation |
| MC-2: Human dignity | The ability to live a life in dignity and respect. | a) Personal Integrity  
b) Ability to force one's rights |
| MC-3: Freedom of arbitrariness | The ability to live without arbitrary interventions in everyday life. | c) Freedom of movement  
d) Political freedom |
| MC-4: Health | The ability to lead a healthy life | a) Health State  
b) Access to Health Systems |
| MC-5: Education | The ability to be educated formally and personally the way one wishes to | a) Formal education  
b) Personal development |
| MC-6: Social Participation | The ability to have employment or pursue activities one is interested in. | a) Access to employment  
b) Informal employment |
| MC-7: Housing | The ability to have sufficient living space and appropriate living conditions | a) Living space  
b) Living satisfaction |
<table>
<thead>
<tr>
<th><strong>Meta- Capabilities (MC)</strong></th>
<th><strong>Definition</strong></th>
<th><strong>Contained Sub-Capabilities</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>MC-8: Ecological Security (From the environment, climate change-related hazards etc.)</td>
<td>The ability to cope with extreme a) natural hazards, including floods and tropical cyclones and also the ability to adapt to ecological and climate variability (natural resources degradation, sea level rise, salinity intrusion etc.) b) The ability to have adequate and clean drinking water</td>
<td>Capable of acting and applying decision-making Strategies (freedom of choice) under ecological and climate variability Access to clean/safe water</td>
</tr>
</tbody>
</table>

Table 2: Selected sub-capabilities operationalized (extended in *italics* by author)

<table>
<thead>
<tr>
<th>Sub-capabilities (SC)</th>
<th>Operationalization (micro level)</th>
<th>Operationalization (macro level)</th>
<th>Variable Social (political) conversion factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC-1: Freedom of movement</td>
<td>The feeling of safety walking alone in the area near one’s home during daytime; Feeling of safety walking alone in the area near one’s home after dark; Being exposed to violence at home</td>
<td>Regional crime rate security (city-ranking)</td>
<td>Public Security measures</td>
</tr>
<tr>
<td>SC-2: Political freedom</td>
<td>Being afraid of political persecution; Being afraid of publicly expressing one’s opinion; Possibility of civil commitment</td>
<td>Index of corruption Freedom of Press index</td>
<td>Constitutional laws; Public censorship</td>
</tr>
<tr>
<td>SC-3: Access to education</td>
<td>Level of education; Formal precondition achieved; Level of Parents' education</td>
<td>Conditions to university access (tuition fees/ restricted access/ etc.)</td>
<td>National School System; Scholarship availability; Legal Restrictions</td>
</tr>
<tr>
<td>SC-4: Personal development</td>
<td>Personal intellectual capacity; Ability to peruse activities provocation one’s interest</td>
<td>Access to/ availability of cultural institutions (museum, theatre, library, etc.)</td>
<td>Entrance fees, Public cultural offerings; Public initiatives</td>
</tr>
<tr>
<td>Sub-capabilities (SC)</td>
<td>Operationalization (micro level)</td>
<td>Operationalization (macro level)</td>
<td>Variable Social (political) conversion factors</td>
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<tr>
<td>SC-5: Access to Health Systems</td>
<td>Personal Health Insurance; Services portfolio</td>
<td>Public health insurance services</td>
<td>Compulsory Health Insurance Systems; Quality health services</td>
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<tr>
<td>SC-6: State of health</td>
<td>Chronic illness; Subjective state of Health; Disadvantages in ordinary activities</td>
<td>Regional Pollution</td>
<td>Retention; Handicapped accessible infrastructure</td>
</tr>
<tr>
<td>SC-7: Subjective well-being</td>
<td>Personal evaluation of well-being; Personal evaluation of living standard (security development)</td>
<td>Economic development Political stability</td>
<td>Continuity in economic development</td>
</tr>
<tr>
<td>SC-8: Economic participation</td>
<td>Share personal income increase in regional economic growth; Share monthly income in fulfilling</td>
<td>Inflation rate Regional availability of goods and services Regional economic growth</td>
<td>Extra charges</td>
</tr>
<tr>
<td>SC-9: Capable of acting and applying decision-making Strategies (freedom of choice)</td>
<td>Capacity development Act and apply decision-making strategies</td>
<td>Institutions, Public policies Access and availability of public goods and services Social and Political Systems (norms and Practices)</td>
<td>State capacity building programs Information dissemination Pro-poor public policies and administrative systems</td>
</tr>
<tr>
<td>SC-10: Access to clean/safe water</td>
<td>Availability of safe water sources Relevant infrastructures</td>
<td>Access and availability of public goods and services</td>
<td>Women, children-friendly infrastructure (sources) Available measures to save and increase the source of safe water</td>
</tr>
<tr>
<td>SC-11: Ability to participate in social and political affairs relevant to being safe</td>
<td>Participate in social and political affairs with dignity and without shame and fear</td>
<td>Social and Political Systems (norms and Practices) Information and communication</td>
<td>Social (norms and values) and political systems (democracy)</td>
</tr>
</tbody>
</table>

Source: Adapted from (Eiffe, 2008) and with own illustration (in Italics & shaded)
2.4 Concluding Remarks

Promoting freedom, well-being and individual dignity are needed to achieve sustainable development goals considering people, the planet and prosperity. The theoretical framework chapter highlights the central relevance to the capability, functionings and well-being of poor people living in vulnerable coastal areas. In the later chapters, we will try to make informational bases relating to the empirical study for this purpose and for the evaluative judgements that provide the fundamentals of the thesis. It also concerns individual preferences and the relevance of the preferences of poor people to overcome their vulnerability by adapting to climate change impacts and environmental variations. This is, in a way, replaced by individual freedoms as a constructive importance set by the individual based on his/ her comparison of preferences. This PhD research also analyses the capability approach to explore the importance and implication of an individual’s capability to adapt to climate change impacts.

Similarly, to what extent does people’s adaptive capacity to climate change depend on people’s freedoms (basic capabilities)? The theoretical framework of the capability approach gives special attention to the capability, functionings and well-being of poor people living in coastal areas with vulnerabilities. It also concerns individual preferences and the relevance of the preferences of poor people to overcome their vulnerability by adapting to climate change impacts and environmental variations. This is, in a way, replaced by individual freedoms as a constructive importance set by the individual based on his/ her comparison of preferences.

As functionings are being and doing, the achieved functionings are realized functionings, not the potential. A person cannot achieve well-being (as resilience to climate change and environmental variations) until s/he has failed to attain the threshold level of functioning. Thus, the capabilities approach gives a theoretical and philosophical platform for measuring the ability of individuals and community well-being.

To conclude here, referring to the central question of “how individual capabilities relate to the ability of the poor people to adapt in response to ecological and climate variability. In this relation, we find that the individual (at the family and community level) climate change adaptation process concerning capability and freedoms in the given ecological settings depends on the relevant aspects of the individual’s capability expansion.
2.6 References of Chapter 2


UNFCCC. Secretariat. (2022). *Dimensions and examples of the gender-differentiated impacts of climate change, the role of women as agents of change and opportunities for women*. UNFCCC.
CHAPTER-3: RESEARCH METHODOLOGY

3.1 The Research Approach

In this study, we address the poor people’s responses to ecological and climate variability through the lenses of Sen’s capability approach (CA). The CA is a broad normative framework (Sabina Alkire, 2013; Frediani, 2010; Kimhur, 2020; Kundal, 2020; Robeyns, 2006), which can be applied to the understanding of an individual’s functionings (beings and doings) and his/her well-being. The CA focuses on the dimensions of human well-being with their socio-economic and environmental arrangements, policies and governance and their impacts on society. The CA can be used to analyze how individuals (people) are free to improve their well-being (ability to be healthy, educated, etc.) and the achieved functionings (beings and doings). By operationalizing the capability approach in this study on coastal Bangladesh, we explore the links and impacts of the conversion factors with individuals’ real opportunities.

Sen’s capability approach has been used extensively in researching an individual’s well-being in development studies (Karimi et al., 2016; Naz, 2022; Suppa, 2016). This study's new perspective is to analyze the livelihood options taken by disadvantaged individuals and their response to the changing environment. A change in climate and environmental degradation add complexity to the livelihood options because of the interplay between individuals, their resources and the environment. Qualitative methods have been preferred as a primary methodological approach because, by the use of qualitative methods, individuals' perspectives and expressions can be employed to uncover their opportunities and obstacles related to social, political, economic, and cultural factors (Kleine, 2011; Mink et al., 2015; Pfannstiel, 2023). Traditional quantitative household surveys may be limited in understanding the complex and dynamic feedback associated with human well-being in a changing environment. In particular, vulnerability to the impacts of climate change on the lives and livelihoods of the coastal inhabitants and their potential to contribute to the adaptation to climate change. This PhD study used exploratory research methods for an in-depth understanding of the effects of climate change on individual well-being, dimensions and interdependence. The study is explicitly dedicated to exploratory research design to explore (conclusive solutions to existing problems) and understand the climate change issues in the vulnerable coastal areas of Bangladesh through the lens of capability approach focusing on human well-being and freedom of choice. By operationalising Sen's capability approach, we have used exploratory studies under the qualitative research methodology to understand and know more about climate change and environmental issues in the coastal areas. This chapter
also aimed to explore the effectiveness of the capability approach in enhancing the climate change adaptation strategies in the coastal region of Bangladesh.

3.2 Research Design

The research design of this study was exploratory. The exploratory research methodology used to understand a research topic better helped identify critical variables, formulate hypotheses, and design the study. The study used a case study approach, focusing on the South-west coastal region, a region in Bangladesh that is highly vulnerable to climate change. The case study approach allows for an in-depth analysis of the complex interplay of social, economic, and environmental factors affecting climate change adaptation and the application of the capability approach. This study employs both qualitative and quantitative data collection and analysis methods and collects both primary and secondary data. The primary data collection involved two main methods: surveys and interviews. The qualitative data collection method was used to gather in-depth insights into the climate change adaptation strategies employed in the South-West coastal areas of Bangladesh (Khulna, Satkhira and Bagerhat). On the other hand, the quantitative data collection method was also used to collect data with survey questionnaires on the socio-economic conditions of the local people, climate change variability, stress and adaptation strategies at the family and community level, and the internal migrant population at the migration destination.

3.3 Embedded Case Study

A case study is a qualitative approach that collects detailed information on the phenomenon in question (Hancock et al., 2021; Yin, 2011). The study used a case study approach, focusing on the South-west coastal region, a region in Bangladesh that is highly vulnerable to climate change. The case study approach allows for an in-depth analysis of the complex interplay of social, economic, and environmental factors affecting the lives and the livelihoods of the coastal population in Bangladesh and their climate change adaptation strategies with the lens of Sen’s capability approach and its application for human well-being.

In the case study, three areas were selected in the southwest coastal regions of Bangladesh for the case study as regards the climate change vulnerability in the coastal areas. The field study locations are adjacent to the Sundarbans (the world’s largest mangrove forest) and Bay of Bengal in the south and West Bengal of India to the west. The southwest region of the coastal areas of Bangladesh is
one of the most vulnerable areas of Bangladesh due to natural disasters and climate change impacts. According to the IPCC's fifth and sixth assessment reports, ‘Bangladesh is among the top five nations classified by the coastal population who are particularly vulnerable to weather and climate change impacts’ (Intergovernmental Panel on Climate Change, 2014b, 2022). The coastal area is vulnerable for many reasons besides climate change (Intergovernmental Panel on Climate Change, 2014b, 2022). It is densely populated, and people depend heavily on natural resources, which are gradually depleted.

Figure 3.1: Coastal zone map of Bangladesh with the study areas (blue)

The study area selection is based on several information analyses on climate change vulnerability and women’s status in the country’s southwest coastal region. According to a gender disparity analysis of 64 districts of Bangladesh, Satkrira district is the most deprived district where the disparity between males and females is the highest (Eastin & Dupuy, 2021; M. M. Khan, 2022; Khatun, 2002), followed by Khulna in Khulna Division. The selected areas were also affected by several devastating cyclones, namely Cyclone Sidr in 2007 and Cyclone Aila in 2009. There are 30 (thirty) Agro-Ecological Zones (AEZ) in Bangladesh. The government has identified the coastal zone as an “agro-ecologically disadvantaged region” (Planning Commission of Bangladesh, 2005) due to scarcity of drinking water, land erosion, the high groundwater arsenic content, waterlogging, water and soil salinity and various forms of pollution, which have slowed down social and economic development (Ahsan et al., 2021; Assaduzzaman et al., 2023; M. M. Khan, 2022). For the study of internal
migration destinations, the Begunbari slum of the Tejgaon in Dhaka city areas was selected as a frequent destination for migrants.

The selected areas are disaster-prone (cyclone, flood, tidal surge) and experiencing severe and moderate drinking water scarcity due to salinity intrusion in the surface and groundwater. Besides salinity, drought also impacts drinking water availability in the dry season. The study areas have heterogeneous ethnic, religious and cultural practices within the communities. The study analyses climate change-related stress (vulnerability), including water resources and adaptation options at the community (local) level in southwestern Bangladesh. It examines the lives and livelihoods of women, including the ethnic minorities (Munda), their access (freedom of choice) to goods and services, and the real opportunities to live the life they value.

### 3.3.1 Literature Review

A literature review helps identify research gaps, trends, and inconsistencies that need further exploration (Creswell, 2013; Ngulube & Patrick, 2021). Secondary data were collected and reviewed before and during the research to get prior information about the relevant issues, including theoretical perspectives, details on the study locations, implemented development projects/programs, results/learnings and government policies. Secondary data collected and reviewed on geophysical and geographical situations, environment, natural resources, climate change and disasters were collected and analyzed beforehand. This review aimed to contextualise the research problem and identify relevant theoretical frameworks and conceptual models. The information provided background and orientation for the participatory data collection.

Specific literature on climate change issues in the coastal areas of Bangladesh, migration and human well-being were also collected and reviewed. Several non-government organizations and development partners have implemented climate change-related development projects in Bangladesh’s southwest coastal region. During this study period, organizations were contacted and collected their information (as reports, information booklets, case studies, evaluations and lessons learned).
3.3.2 Observational Research

Observational research involves observing, recording and understanding the inhabitant's behaviour patterns and perceptions in a natural setting (Shukla et al., 2019; Silverman, 2016). In this research, the author has resided there in the study location, and spent time with local inhabitants (who are experiencing the effects of climate change) to observe their behaviours and actions in response to climate change impacts, the perception of local people (participants and non-participants of the study) regarding climate change and environmental issues as well as the livelihoods pattern in the coastal areas of Bangladesh. In the study, primary contacts were made with shopkeepers in the locality, NGOs people, community leaders, and the local government institutions (members and chairman of the union councils), which allowed them to gradually get familiar with the communities (ethnic and non-ethnic and with inhabitants with diverse professions, e.g. farmers, fishermen, coastal residents among others) in the study areas in Khulna, Satkhira and Bagerhat.

3.3.3 Key Informant Interviews (KII)

Interviews help collect detailed and in-depth information on climate change adaptation. Participants can provide their views, experiences, and insights on climate change and its impacts through interviews. KII involves interviewing individuals with specialized knowledge or experience.

Figure 3.1.1: Key Informant Interview (KII) (with Union Council Chairman)
related to climate change adaptation in the coastal areas of Bangladesh. Examples of crucial informants could include local government officials, NGO representatives, or climate change experts. The qualitative data were collected using in-depth interviews with key informants, including community leaders, local government officials, and representatives of non-governmental organizations (NGOs) working in the study areas. The interviews were conducted in the local language and recorded with the participants' permission. The interviews focused on the key informants' perceptions of the relationship between climate change adaptation and the capability approach.

The interview method used a semi-structured interview guide to collect qualitative data from key informants, including government officials, non-governmental organizations (NGOs), and community leaders. The interviews aimed to provide insight into the institutional and policy frameworks for climate change adaptation in the study areas, the capacity of local institutions and organizations to support adaptation, and the role of individual, family and community participation in adaptation efforts.

3.3.4 Focus Groups Discussion

Focus groups involve bringing together people with similar demographic or environmental backgrounds to discuss climate change adaptation. It is a valuable method for exploring common themes and unique ideas about climate change adaptation. We use focus group discussions (FGDs) that are particularly useful when participants' reasoning behind their views is of interest on livelihood well-being (Kundal, 2020; Rabbani et al., 2022; Van Ootegem & Spillemaeckers, 2010) and questionnaire surveys to reach a more significant number of respondents. The study employed FGD after completing the questionnaire surveys, as FGDs encourage active discussion in a friendly environment. The time and resources can be used to dig deeper for additional information and clarify the questionnaire survey results. A comparatively small group is easy to facilitate, and in the homogenous groups (farmers, women), obtaining different expressions of similar information is helpful. In mixed or larger groups, people have the confidence to express their views on specific issues.

Ethnic communities living in the study areas nearby Sundarbans Reserve Forest (SRF) are considered comparatively more vulnerable to climate change impacts than non-ethnic people ((Assaduzzaman et al., 2023; Boas, 2020; Nasrin et al., 2023). Five special focus group discussions were conducted in the ethnic communities (Munda community) and other than the Munda community within the study areas. SAMS (Sundarbans Adibasi Munda Sangstha), an
NGO in that area that works with the Munda Community in Shyamnagar Upazila, tribal (i.e. the Munda community) people live in eight unions in Shyamnagar. Focus groups were held in five of these 8 (eight) unions and a total of 12 villages in Shyamnager upazila.

Table 3.1.1: Ethnic community study villages and unions in Shyamnagar upazila

<table>
<thead>
<tr>
<th>Upazila*</th>
<th>Union</th>
<th>Village</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shyamnagar</td>
<td>Koikhali</td>
<td>Munda para and Sheikh para</td>
</tr>
<tr>
<td></td>
<td>Ramjan nagar</td>
<td>Taranipur Mundapara, Taranipur Gazipara</td>
</tr>
<tr>
<td></td>
<td>Munshigonj</td>
<td>Uttar Kadamtala, Garage Modhopara, Jelekhali Mundapara, Purba Jelekhali</td>
</tr>
<tr>
<td></td>
<td>Burigoalini</td>
<td>Datinakhali Mindapara, Koyelbari</td>
</tr>
<tr>
<td></td>
<td>Ishwaripur</td>
<td>Bakultala Mundapara, Srifalkathi Mundapara</td>
</tr>
</tbody>
</table>

*Upazila is a national institute of local government governed by the Ministry of Local Government and Cooperatives, Government of the Peoples Republic of Bangladesh.
3.3.5 Participatory Rural Appraisal (PRA)

PRA is a method that involves engaging with communities to understand their knowledge, beliefs, and practices related to climate change adaptation. This method can involve various activities, such as mapping exercises or community-led discussions, that help researchers understand the social and environmental context in which adaptation occurs. Participation is part of most research and development strategies and is also regarded as a fundamental human right (Narayanasamy, 2009; Reggers et al., 2016). In this research, local people were engaged as much as possible to obtain relevant data and information by conducting participatory exercises (FGDs, participatory social mapping, community hazards mapping, participatory wealth ranking, scaling of access to their needs and deprivation etc.).

Participatory tools enabled the research to obtain local people’s perspectives on poverty, vulnerability, risk, disasters and climate change issues at both local and regional levels. The participatory approach aims to get people to take part in presenting their perspectives (Md Monirul Islam et al., 2014; Lu, 2012). We determined which indicators and how many to select based on priorities expressed by the villagers during the participatory exercise, household survey data, personal experience and a thorough review of the literature on rural poverty. The field study also employed some participatory exercises in the selected communities (qualitative approach), including participatory mapping that involved local communities in creating maps that depict their perceptions, knowledge, and experiences of climate change and its impacts in the area. Through this mapping, they identified areas particularly vulnerable to climate change and supported the development of targeted adaptation strategies. They also did hazard analysis, participatory wealth ranking (following the standard of living index), participatory scaling, etc. Intensive fieldwork was conducted from 2014-2016 and then again from 2018-2019, which included direct observation and a review of relevant secondary information focused on the study areas (Khulna, Satkhira and Bagerhat).
Figure 3.1.4: Participatory social mapping (above)

Figure 3.1.5: sketched by women from the community (left) and modified sketch (right)
3.3.6 Survey Research

Survey research was used in this study as a helpful method for exploring public perceptions, attitudes, and beliefs about climate change adaptation. The survey method used a semi-structured questionnaire to collect quantitative data from a sample of 921 households in Khulna (Dacope Upazila), Satkhira (Shyamnagar) and Bagerhad (Mongla and Rampal). The study used a multi-stage random sampling technique to select the study participants. In the first stage, the study area was divided into three zones, and one/ two unions were selected from each sub-districts/ upazila. In the second stage, households were selected from each union using systematic sampling. Finally, key informants were selected using purposive sampling for the study. The survey questions were designed to elicit information on the households' socio-economic characteristics, perceptions of climate change, vulnerability and adaptation strategies, including migration. The survey sample was selected using a multistage random sampling technique. A semi-structured questionnaire was developed and designed per the thesis research objectives. The questionnaire was tested for validity and reliability using a pilot survey before being finalized. The piloting of the questionnaire was employed with 5 (five) randomly selected community people, and the gaps and redundancy were scrutinized afterwards. The first part of the questionnaire requested general and socio-economic information from the respondents, and the second part focused on livelihood aspects and climate change adaptation options. In the third part, the questions explored the non-economic and cultural aspects of the respondent’s community; access, opportunities and availability of resources; and institutional arrangements.

Figure 3.1.6: Interview with local inhabitant (photo: Author)
The fourth and final part of the questionnaire asked about climate change displacement/migration, background, causes and consequences. The author administered the questionnaire survey with the assistance of one experienced data collector (contracted locally) in ten unions of four upazilas (sub-districts) in three districts of the coastal regions of Bangladesh. The data were collected with 1035 questionnaires within four sub-districts under three districts. One/two unions and villages were selected for the interview. Thirty-six focus group discussions were held to cross-check and validate answers from the respondents and to accommodate any additional information revealed. After data collection, the data were scrutinized and analyzed to elucidate the research questions.

Information was collected from households of the coastal communities with diverse professional groups (Farmers, fishermen, women, ethnic people, small traders and shopkeepers, and community leaders, etc.). The result of the fieldwork was rich data on socio-economic conditions, livelihoods, climate change vulnerability, adaptation option practices, gender equality, decision-making, migration, and access and constraints to resources and opportunities collected. The data were then systematically processed (data validation, cleaning, coding. Analysis, etc.). The data collection details are presented in Table 3.1.2.

The coastal areas of Bangladesh. Examples of key informants could include local government officials, NGO representatives, or climate change experts. The qualitative data were collected using in-depth interviews with key informants, including community leaders, local government officials, and representatives of non-governmental organizations (NGOs) working in the study areas. The interviews were conducted in the local language and recorded with the participants’ permission. The interviews focused on the key informants’ perceptions of the relationship between climate change adaptation and the capability approach.

The interview method used a semi-structured interview guide to collect qualitative data from key informants, including government officials, non-governmental organizations (NGOs), and community leaders. The interviews aimed to provide insight into the institutional and policy frameworks for climate change adaptation in the study areas, the capacity of local institutions.
Table 3.1.2: Summary of data collection methods used in this thesis

<table>
<thead>
<tr>
<th>Period</th>
<th>Type of Data</th>
<th>Purpose of Data Collection</th>
<th>Method of Data Collection</th>
<th>Target Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014-16</td>
<td>A total of 1035 (921 Questionnaire survey+114 only on migration issues)</td>
<td>To assess the climate change impacts and adaptation, focusing on socio-economic aspects, livelihoods, women, migration and governance.</td>
<td>Questionnaire survey through random sampling/ Questionnaire survey through random sampling/ The data for this study were collected through semi-structured interviews, focus group discussions, and document analysis. Purposive sampling was used to select participants who have experienced the impacts of climate change.</td>
<td>Although household heads were targeted for collecting information, during the day, most of the male members (bread earners) were absent; therefore, the information was also collected from women/ next to the household head. Semi-structured interviews were conducted with the selected participants.</td>
</tr>
<tr>
<td></td>
<td>Questionnaires survey</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016-2020</td>
<td>A total of 36 Focus Group Discussions (FGD); Social resource mapping, Hazards, analysis,</td>
<td>Participatory information collection, cross-checking and validation data obtained from the household questionnaire survey to find missing/ additional data</td>
<td>Focus Group Discussion (FGD); PRA (Participatory Rural Appraisal)</td>
<td>Each group consisted of one respective category of people, like males &amp; females of different occupations and ethnic and non-ethnic groups of people.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Field observations, Reconnaissance survey</td>
<td>To check the real situation and analysis in cooperation with the local people</td>
<td>Transect walks, Key informant interviews (KII)</td>
<td>Local/ community people</td>
</tr>
</tbody>
</table>
### 3.3.7 Case Study Location Context

The field study was conducted in Khulna, Satkhira and Bagerhat districts in Bangladesh’s southwest coastal regions (Figure 3.2). The population in the coastal areas of Bangladesh is 6.2 million, and they are most vulnerable to climate change (Abedin et al., 2014; E. Alam et al., 2018) and Shaw, 2013a). The selected study areas comprised six unions (local government units) from four sub-districts (upazila under the above three districts). In addition to the selected coastal rural areas, we collected data from one slum (Begunbari) in Tejgaon Thana areas in Dhaka city. The Shyamnagar upazila (sub-district) in Satkhira district, two unions from the Dacope upazila in Khulna districts and one union from each of the Mongla and Rampal upazila of Bagerhat District.

**Table 3.1.3**: Study areas in three coastal districts

<table>
<thead>
<tr>
<th>District</th>
<th>Khulna</th>
<th>Satkhira</th>
<th>Bagerhat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upazila (sub-district)</td>
<td>Dacope</td>
<td>Shyamnagar</td>
<td>Mongla</td>
</tr>
<tr>
<td>Union Council (local government unit)</td>
<td>2 unions</td>
<td>6 unions</td>
<td>1 union</td>
</tr>
</tbody>
</table>

The mixed methods approach includes qualitative and quantitative surveys, structured and semi-structured questionnaire interviews, focus group discussions, key informant interviews, participant’s observations and participatory approach of wealth ranking, poverty and vulnerability analysis, participatory scaling of basic needs and deprivation (in terms of access) were used as data collection tools for this PhD research work. Each chapter describing the field research also contains an account of the specific research methodology used for the results presented in that chapter. An overview of data collection tools used in the different chapters is presented in Table 3.1.
Table 3.1.4: Overview of the quantitative and qualitative methodology used to address the research questions.

<table>
<thead>
<tr>
<th>Research questions</th>
<th>Qualitative tools</th>
<th>Quantitative tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1: How does freedom of choice differ based on gender and ethnicity?</td>
<td>Individual interviews and FGD (n=25)</td>
<td>Questionnaire survey (n=921) to check the difference in access to resources and services, individual entitlements by gender and ethnicity</td>
</tr>
<tr>
<td>Q2: How may these two (gender and ethnicity) interact with each other under the adverse consequences of climate change, causing particular social groups residing in similar geophysical conditions to be trapped in the unfavourable environment?</td>
<td>FGD (n=6 for ethnic people only) among the different social groups, male (ethnic/ non-ethnic), female(ethnic/ non-ethnic), farmers, fishermen</td>
<td>Quantifying climate change impacts of different sectors (health, agriculture, livelihoods) considering livelihood options (Pls. see annexe-3)</td>
</tr>
<tr>
<td>Q3: How do pull and push migration factors differ among various socio-economic groups?</td>
<td>Participatory wealth ranking following standard of living index (SLI), FGDs (n=22; 215 individuals)</td>
<td>Household categories (in terms of wealth well-being), livelihood capitals, decision-making process</td>
</tr>
<tr>
<td>Q4: Where is the border between migration as an adaptation option and forced migration?</td>
<td>Participatory wealth ranking following standard of living index (SLI), FGDs (n=22/215 individual)</td>
<td>The decision-making process, preventive factors (from push and pull migration factors)</td>
</tr>
<tr>
<td>Q5: How does the well-being of permanent migrants compare to the well-being of non-migrants?</td>
<td>Personal observation, transect work, and reconnaissance survey to have a proper understanding of the non-migrant population at their destination</td>
<td>Through a questionnaire survey (n=921) to check the difference in access to resources and services, individual entitlements by gender and ethnicity</td>
</tr>
<tr>
<td>Q6: How does the migration decision affect the well-being of the migrant group?</td>
<td>Personal observation, transect work, and reconnaissance survey to have a proper understanding of the migrants' population at their destination</td>
<td>114 (64 from coastal sub-districts and 50 from the slum areas in the city) to have different livelihood/ basic needs perspectives of the migrants and non-migrants</td>
</tr>
</tbody>
</table>
3.4 Data Analysis

The data collected from the interviews are transcribed and translated into English. The data are then analyzed using thematic analysis, which involves identifying patterns and themes. The analysis is guided by the key concepts and themes identified in the literature review and the interview protocol.

The analysis involves several stages, including:

- **Familiarization with the data** involves reading and re-reading the transcripts to understand the content deeply.
- **Data cleaning:** Collected data were checked to remove redundancy and, in case, rechecked again.
- **Generating initial codes** involves identifying keywords and phrases in the data relevant to the research questions.
- **Developing themes (following research questions)** involves grouping the initial codes into broader themes and sub-themes.
- **Reviewing and refining themes (following research questions):** This involves reviewing and refining the themes to ensure that they accurately capture the content of the data.
- **Writing up the analysis** involves summarizing the findings and presenting them clearly and concisely.

3.5 Limitation of Data Collection

Data were collected mainly from primary sources applying case studies and exploratory methods, and a desk review of the secondary resources was also conducted to get the totality and the in-depth understanding of the research issues in the coastal areas of Bangladesh, including national climate-related policies, plans and strategies. As a researcher native to Bangladesh, there were several advantages, for example, cultural and contextual knowledge, language and understanding of different perspectives, which helped to avoid possible bias in the information received from the respondents.

The study areas are vulnerable to several hazards, so people expected outreach help and assistance, which was difficult to avoid. During the monsoon, the weather significantly influences information collected locally. Communication is not easy, and it is hard to commute through the villages (muddy and slippery!). As the areas are classified as ‘climate vulnerable’, the communities receive many researchers, so it was sometimes difficult to get their interest in providing data for this research. However, this was solved by thoroughly explaining the study objectives and purposes.
3.6 References of Chapter 3


CHAPTER- 4: GENDER-ETHNICITY INTERSECTIONALITY IN CLIMATE CHANGE ADAPTATION IN THE COASTAL AREAS OF BANGLADESH

4.1 Abstract

Climate change effects are not uniform and have disproportionate impacts among different groups of people within communities. It is, therefore, important to understand the underlying issues of intersectionality for climate change adaptation and human well-being. This paper aims to measure human capabilities and freedom of choice by analyzing perceived climate change impacts and current climate change adaptation ability among ethnic and non-ethnic communities in Bangladesh. This study applies a range of participatory rural appraisal tools and key informant interviews to assess the impacts of climate change when considering gender and ethnicity. Women in the coastal regions have less access to resources and services because of social capital and cultural practices, directly or indirectly influencing their adaptation to climate change. Women have limited or no participation in decision-making processes at family or community levels, impacting their vulnerability and well-being. Therefore, the ability of women to moderate their vulnerability and risk and to adapt effectively to the impacts of climate change and natural hazards needs to be addressed.

Keywords: gender; ethnicity; intersectionality; climate change adaptation; capability approach; coastal regions; Bangladesh

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2 Part of this chapter has been published in the MDPI Sustainability Journal on 17 February 2023 (Citation: Assaduzzaman, M.; Filatova, T.; Lovett, J.C.; Coenen, F.H.J.M. Gender-Ethnicity Intersectionality in Climate Change Adaptation in the Coastal Areas of Bangladesh. Sustainability 2023, 15, 3744. https://doi.org/10.3390/su15043744)
4.2 Introduction

The adverse consequences of climate change have quite uneven geographies. They also unevenly impact various societal groups differentiated by generations, age classes, income groups, occupations and genders (Dodman et al., 2022; Groupe d’experts intergouvernemental sur l’évolution du climat. Working Group II. & Intergovernmental Panel on Climate Change, 2007; Intergovernmental Panel on Climate Change, 2014a). Developing countries and the poorest people face the impacts of climate change disproportionately and thereby exacerbate inequities in lives and livelihoods, including health, access to adequate and nutritious food, clean water, and other resources ((Dodman et al., 2022; Intergovernmental Panel on Climate Change, 2014a). Among them, women’s vulnerability to natural disasters and climate change has been highlighted through many studies around the world (Alston, 2014; Arora-Jonsson, 2011; Dasgupta et al., 2015; Pearse, 2017; Singh et al., 2010). There is more to this than physical and biological differences between genders. Specifically, the variability in the magnitude of vulnerability between sexes and their corresponding capacities to adapt to climate change depend on social, economic, and political factors and contexts (Aberman et al., 2015; Cannon, 2002; M. M. Khan, 2022; Skutsch et al., n.d.). Gender-focused researchers are yet to get a comprehensive overview of women's levels of economic well-being (Briar, 2000) and the factors that enhance or obstruct women's ability to respond to the negative effects of climate change (Singh et al., 2010). Climate Change is gender-sensitive, and women are more sensitive than men to climate change, which is also linked to women's socioeconomic position (Alston, 2014; Arora-Jonsson, 2011; UNFCCC. Secretariat, 2022). In particular, women and ethnic minorities are more vulnerable, among others, to the impacts of climate change due to chances for participation in economic activities, personal income for fulfilling basic needs, access to the health system and state of health, access to education and freedom of movement (mobility) to access required opportunities & services. For instance, in the 1991 cyclone disaster in Bangladesh, 140,000 people were killed, of which 90% were women (Aguilar et al., 2007).

Negative consequences of climate change, disasters and gender in Bangladesh have attracted quite some scholarly attention (Akter, 2009; Alston, 2014; Cannon, 2002; Masika, 2002; Shameem et al., 2015; Terry, 2009). However, while gender is one of the obvious and most studied aspects of climate change's uneven distribution and adverse consequences, there are other silent aspects. Ethnicity is also important, which comes with corresponding boundaries of action imposed by social norms and consequent lack of freedom of choice and livelihood options. Bangladesh has several ethnic communities with diverse social and cultural differences. Yet, there are almost no studies about how climate change impacts vary between ethnic groups or whether an interplay of gender and ethnicity amplifies or impedes individual chances of successful adaptation.
We address this gap by looking at the difference in perceptions of climate change impacts and adaptation options by gender and ethnic group within the poorest coastal communities in Bangladesh. We focus on freshwater availability as the primary concern for local people and on migration as an adaptation option. Decreasing freshwater availability due to rising sea levels has been signalled by various authors as a major climate change impact (Dasgupta et al., 2015, 2021; M. S. Hossain et al., 2016; H. Huq & Easher, 2021; Kabir et al., 2020), while many authors have suggested that migration is the primary adaptation measure open to people in this area (I. Ahmed et al., 2019; Assaduzzaman et al., 2020; Ayeb-Karlsson et al., 2016; Evertsen & van der Geest, 2020; M. R. Islam & Hasan, 2016; Md Monirul Islam et al., 2014; Kartiki, 2011; Luetz, 2018; Mallick & Siddiqui, 2015). It is becoming clear, however, that migration may not be an option for all groups within the population and that inability (or an absence of a free choice) of some sections of the population to move is creating clusters of the trapped population in the most vulnerable zones in Bangladesh (Figure 1).

We used focus group discussions to shed light on the following research questions: (1) are the impacts of climate change, particularly as regards decreasing freshwater availability, perceived and experienced differently by different ethnic groups and between genders? (2) does ethnicity and gender amplify or impede freedom of choice regarding adaptation, particularly the ability to migrate? While much has been said about climate extremes and high-end scenarios, it is also important to investigate the socio-economic vulnerability extremes in climate adaptation and identify to what extent gender and ethnicity belonging play a role here.

The paper continues as follows. Section 2 presents the theoretical framework within which the fieldwork (Section 3) was carried out. We present the results of the experiences concerning climate change as perceived by ethnic and non-ethnic coastal communities differentiating by gender in Section 4. These results are accompanied by the data on access to resources and freedom of choice that influence respondents’ capability to migrate as an adaptation option, the status of women in ethnic and non-ethnic communities, and their role in making decisions. Section 5 concludes.

4.3 Trapped Population: Freedom of Choice, Well-Being and Climate Change Adaptation in the Lens of Sen’s capability approach

The ability to migrate poor and vulnerable women depends on their economic structure, social status, and access to resources and opportunities (Tunstall et al., 2006; Oswald Spring, 2008; Hunter and David, 2011). The freedom of choice for women to migrate also depends on their social networks and social capital. If they lose their social capital, then their freedom of choice is impacted too, and
The relationship between vulnerability to environmental change and mobility shows that populations most exposed and vulnerable to the impacts of climate change may have the least ability to migrate (Source: IPCC, AR5. WGII., 2014)

they are trapped with vulnerability and risk of climate change with relatively similar geophysical conditions.

Considering the issues, the study concentrated on women’s vulnerability, freedom and well-being at the family and community level to respond/adapt to climate change and live a life of dignity and integrity. The paper makes steps towards closing the gap in the literature on women’s freedom of choice and climate change adaptation with participation at family and community level discourses for resilience to climate change impacts and human well-being. We explore how social capital and cultural aspects interact with freedom of choice and the well-being of the poor and vulnerable women (ethnic and non-ethnic) in the coastal regions of Bangladesh. The paper roots itself in the assessment of ‘the Capability Approach’, where freedom is seen as an essential element of human well-being (Alkire, 2007). In other words, capabilities refer to genuine freedoms a person “enjoys to lead the kind of life he or she has reason to value” (Sen, 1999, p.87). Freedom is a primary property and right of human beings confronting the physical world. Freedom is also related to the opportunity to achieve what people value and reason to value, which is also concerned with the ability to achieve (Alkire, 2007). A person’s capability is usually defined concerning her ability to function, reflecting what she
can do within a certain context (Sen, 1987). This paper applies this perspective to study various degrees of individual freedoms among social groups differentiated by gender, ethnicity, and intersectionality to adapt to the impact of climate change. Naturally, various factors affect an individual's freedom, which we see as conversion factors (Figure 2). They are, for instance, personal, social, cultural & environmental conversion factors (Robeyns, 2005). Individual capabilities also depend on resources and functioning within different contexts as well.

Figure 4.2: Capability Approach and evolving capabilities (Source: adapted from Biggeri & Karkara, 2014:23)

Adverse consequences of climate change affect individuals and communities worldwide but are distributed unevenly geographically and socially. People already in vulnerable positions in societies – women and some ethnic groups– feel the adverse impacts most acutely. According to Amartya Sen, there are five instrumental freedoms that, if present and if individuals have access to them, will provide opportunities for them to “act in their self-interests and reduce their vulnerability” (Roy & Venema, 2002). Access to these instrumental freedoms –political, economic and social freedoms, transparency guarantees and protective security – is necessary for women to gain a better quality of life, acquire the necessary capabilities, and act as change agents (Sen, 1999). Thus, climate change plays a vital role from the perspective of the capabilities approach: it puts some instrumental freedoms
under pressure by altering the conversion factors. In particular, severe environmental changes undermine livelihood options and health conditions.

In the context of climate change, migration is sometimes seen as one of the adaptation options. Yet, the ability of people to migrate depends on their economic and social status and ability to access resources and opportunities (Tunstall et al., 2006; Oswald Spring, 2008; Hunter and David, 2011). The freedom of choice of various social groups to migrate also depends on their social networks and social capital. This paper focuses on answering two research questions. Firstly, how does freedom of choice differ based on gender and ethnicity? Secondly, how may this two fuel each other under the adverse consequences of climate change, causing particular social groups that originally resided in similar geophysical conditions to be trapped in the unfavourable environment? Considering these issues, we concentrate on the vulnerability of women and ethnic minorities, their freedom and well-being at the family and community level in adapting to climate change and living a life of dignity and integrity.

**4.4 Methodology**

We conducted a PRA study in the four upazilas (sub-districts) from Khulna, Satkhira and Bagerhat districts in the southwestern coastal region of Bangladesh (Figure 3). For the ethnic Munda community, we have conducted FGDs and interviews in the Satkhali, Syamnagar, under the Satkhira district. Due to its geophysical condition, this region suffers frequent natural hazards and disasters, including flooding, cyclones and storm surges, water logging, drought, etc. It is also predicted to be adversely affected by climate change. We used a mixed methods approach for collecting information at the family/household and community levels. These districts are also among those where the disparity between males and females is the highest in terms of education (literacy rate), income (wage rate), health (nutrition) etc., according to a gender disparity analysis carried out over 64 districts in Bangladesh (Khatun, 2002). There are also significant ethnic diversities in the region, with ethnic (Munda) and non-ethnic communities. The study area also has diverse religious and cultural practices and ethnicity. Hindu, Muslim, and Christian people living within communities may have different socio-economic conditions and gender traditions. The initial ‘primary contact’ with the community and households was made through NGO workers working in different development projects and local government institutions (specifically members and chairpersons of the union councils) in the study area. A ‘reconnaissance’ survey was made in the study areas, and we used transect walks to source preliminary information in the selected study locations. This informal process made it possible to meet people, familiarize themselves with the communities and understand the local context better. The methods used to gather data were (1) key informant interviews using open questions, (2) a total of
12 focus group discussions (FGDs) following occupations, gender and ethnicity, and (3) interaction (key informant interviews) with NGOs. The Munda people live in clusters within villages but are separated from the mainstream community. In the study, almost 80% of the respondents were women in the non-ethnic community because of the absence of the male member of the family due to daily work during day time and, at the same time, we found the male members during the daytime for an interview in the ethnic community as the ethnic women do work in the field during daytime (found in the six FGDs).

Another six FGDs focused on migration, water resources and livelihood issues with different compositions of participants (male, female, mixed group, farmer, fisher-folk, and day labourer, etc.). By profession, they are daily labour, fisher and other natural resources collectors (from the mangrove forest, Sundarbans). Data was collected (as part of the PhD study) on socio-economic conditions, livelihoods, gender equality, access and constraints to resources and social networks, as well as perceptions of climate change and adaptation practices and climate change migration practices. The results presented in the next section summarise the data gathered in the exercises mentioned above. The issues are mentioned in order of importance, based on the frequency and emphasis the
participants gave them. There is also significant ethnic diversity in the region, with ethnic (Munda) and non-ethnic communities. In Bangladesh, there are divergent opinions on the names and numbers of the indigenous/ethnic groups. Among the ethnic groups, Munda is one of them (Roy, 2012) with their language and history. The study area has diverse religious and cultural practices and ethnicity: Hindu, Muslim, and Christian people living within the community with different socio-economic conditions and gender perspectives.

4.5 Results and Discussions

We present the results of this fieldwork to answer our two research questions. In particular, we first identify any potential differences in the perspectives on climate change as perceived by ethnic and non-ethnic communities differentiating between male and female respondents. Since adverse consequences of climate change in this region mostly affect freshwater availability, we investigate how this problem disproportionately impacts male and female inhabitants in ethnic and non-ethnic communities. We continue by presenting the cumulative results of the focus group discussions and interviews regarding women’s participation in decision-making within a household and aspects of migration decisions that our respondents consider important. By combining the information from the focus group discussions (FGDs), particularly 06 (six) FGDs within the people in the ethnic community and we also analyze the mobility following gender and ethnicity for social network and access to institutional opportunities and services. We identify if there are differences across genders and cultures of the ethnic groups and whether the differences along these two dimensions amplify or attenuate the capabilities of the corresponding sub-groups to exercise their freedoms when adapting to climate change.

4.5.1 Perceptions of Climate Change and Its Consequences

Our data show that the local people in the study areas experience climate change in their daily lives by observing seasonal changes, changing rainfall patterns, and extreme weather conditions and noticing changes in the intervals of occurring natural disasters and their frequency and intensity in Bangladesh. As extreme weather conditions worsen, people in the study areas experience differentiated impacts according to gender and ethnicity. Generally, men look at the problems exacerbated by climate change through a more long-term and strategic horizon. At the same time, local women think very differently about all issues in general, including climate change: they are more focused on daily family needs rather than strategic long-term solutions and decisions. Thus, women observe climate change consequences only as far as they disrupt the daily lives within their family
circle. At the same time, men compare the current situation to that in the past and foresee more long-term consequences and trends for the community at large. This major difference in female vs male position is identical within the traditional and ethnic community as described below:

Table 4.1: Perceived climate change impacts

<table>
<thead>
<tr>
<th>Gender</th>
<th>NON-ETHNIC community</th>
<th>ETHNIC (MUNDA) community</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MEN</strong></td>
<td>(Think strategically for a comparatively longer period, more community-oriented, linked to governance and institutional decision-making)</td>
<td></td>
</tr>
<tr>
<td><strong>Increasing frequency and intensity of the natural hazards in the region</strong></td>
<td>Increasing saline water intrusion affects the availability of freshwater.</td>
<td></td>
</tr>
<tr>
<td><strong>Increasing variation in temperature and rainfall</strong></td>
<td>Duration and characteristics of seasons changed (there are officially six seasons in Bangladesh, but considering changing seasonality, now only three major seasons can be perceived (summer, rainy and winter))</td>
<td></td>
</tr>
<tr>
<td>Agriculture and livelihoods become vulnerable (loss of agricultural production due to natural hazards, i.e., cyclones, flooding and storm surges, etc.)</td>
<td>Livelihoods (mostly non-agricultural) become vulnerable (as natural resources are depleting in the surrounding areas, less opportunity to get jobs in agricultural production systems in the areas)</td>
<td></td>
</tr>
<tr>
<td>They use natural resource depletion (fish, crabs, etc.) to harvest for their livelihoods.</td>
<td>Natural resources depletion (mostly forest and non-forest resources, shrimps fry), which they collect and sell for their livelihoods</td>
<td></td>
</tr>
<tr>
<td>Fresh water crisis due to increased salinity because of rising sea level</td>
<td>Daily lives and livelihoods become harder because of extreme weather conditions, which affect their incomes (during disasters, they can’t work for daily family earnings, etc.)</td>
<td>Daily lives and livelihoods become harder because of extreme weather conditions, which affect their incomes (during disasters, they can’t work for daily family earnings, etc.)</td>
</tr>
<tr>
<td>Daily short-term concerns, concentrate only on own family circles, satisfy essential family needs</td>
<td>Harder to maintain good health because of the lack of nutritious foods (lack locally grown vegetables and fruits), but they have access to modern healthcare.</td>
<td>Similarly, lack of locally grown vegetables and fruits, therefore, a lack of nutritious food. Moreover, they depend on traditional health treatments because of the limited access to modern healthcare.</td>
</tr>
<tr>
<td>Face challenges in homestead gardening due to extreme weather (salinity, drought, flooding etc.), which would constitute a large share of family subsistence</td>
<td>Homestead gardening contributes little to families’ food consumption as they are landless and have exceedingly small house plots.</td>
<td></td>
</tr>
</tbody>
</table>

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As presented in Table 1, the study participants' perceptions align with expert opinion. Salinity intrusion has been indicated as one of the crucial environmental factors in the coastal areas of Bangladesh, impacting land, water, biodiversity, and human health (M. Z. Alam et al., 2017). The coastal zone of Bangladesh can be considered a ‘live example’ of climate change impacts on the lives and livelihoods of the people. The field survey found that people in the areas have less homestead (vegetables and fruits) production and face difficulty in seasonal homestead gardening, especially in the dry season, because of freshwater scarcity. For this reason, the study went into more depth on this topic.

4.5.2 Access to Fresh Water Resources

In the southwest coastal region of Bangladesh, scarcity of fresh water (considering quality, access and availability) is the primary or most important impact of climate change (Sherin et al., 2020). Salinity (intrusion) affects the lives and livelihoods of the coastal people. Therefore, salinity is considered one of the migration drivers in the coastal areas (particularly in the study areas) of Bangladesh (Chen & Mueller, 2018). By the end of the twenty-first century, water will probably be more saline (Clarke et al., 2015). Salinization in both surface and groundwater and the soil in the southwest coastal regions of Bangladesh is one of the major problems noted in the study. This adversely affects the agricultural production system, coastal ecosystem and biodiversity, human health and overall livelihoods. In the coastal areas of Bangladesh, salinity intrusion is a major cause of the reduction of freshwater availability and agricultural productivity, directly impacting lives and livelihoods in that region. (Afroz & Alam, 2013). Salinity intrusion is one of the environmental risk factors for the local communities (men -women, ethnic and non-ethnic), which affects their capabilities differently. In the focus group discussions (FGDs), we found insight information on the prevailing water resources situation of the study area. Based on the FGDs analysis, we draw the following sections on access to water resources to visualize following the question of various social groups' access to fresh water resources (gender and ethnicity) and how individual freedoms are inclined. Women and children in coastal areas of Bangladesh are generally responsible for household water collection (Mallick & Roldan-Rojas, 2015). They are also the primary water users for drinking, cooking food, washing, maintaining livestock and personal health and hygiene (washing and cleaning) etc. Only a few (<5%) households have their ponds in their homestead for domestic washing and cleaning purposes, while most people don’t have their ponds. In the dry season, the ponds dry and have almost no water, and it is muddy. Nonetheless, poor management of the open water sources (ponds, canals, pond sand filters etc.), high salinity in the water and lack of water resources of appropriate quality are the main problem for the people living in the coastal areas. Women invest long hours carrying heavy
Table 4.2: Access to freshwater resources

<table>
<thead>
<tr>
<th>Gender</th>
<th>NON-ETHNIC community</th>
<th>ETHNIC (MUNDA) community</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MEN</strong></td>
<td>Saline water intrusion affects the availability of freshwater</td>
<td>Salinity is increasing, which affects not just their livelihoods but also their health condition (health and nutrition problems)</td>
</tr>
<tr>
<td></td>
<td>Salinity is increasing, and freshwater sources are decreasing in volume, impacting agriculture and fisheries.</td>
<td>Salinity is increasing, which affects not just their livelihoods but also their health condition (health and nutrition problems)</td>
</tr>
<tr>
<td></td>
<td>Few freshwater sources are available, but not enough for irrigation for small-scale agriculture and vegetable production.</td>
<td>No freshwater sources (Tube-well, Pond sand filter, freshwater pond) are available within the community for daily life except rainwater harvesting tanks and ponds.</td>
</tr>
<tr>
<td></td>
<td>Ponds dry earlier, even long before the rainy season.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water availability for agricultural production is a major problem along with drinking water.</td>
<td>Fresh water shortage for drinking and daily uses</td>
</tr>
<tr>
<td></td>
<td>Men from the family usually don’t carry water. Men carry water when women are ill or not present household.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Women are responsible for collecting water and cooking food, washing etc.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Comparatively have more access to water resources because of the community dominance (considering main &amp; large communities)</td>
<td>Comparatively less access to water resources due to ethnic isolation (small and isolated communities)</td>
</tr>
<tr>
<td></td>
<td>Freshwater collection points are within the traditional community (large area)</td>
<td>Water (fresh) collection points are within the ethnic community (clustered in a small area)</td>
</tr>
<tr>
<td><strong>WOMEN</strong></td>
<td>Women walk up 1-3 kilometres to collect drinking water</td>
<td>Women up to 2-5 kilometres to collect drinking water</td>
</tr>
<tr>
<td></td>
<td>A few (5-7%) households in the community have improved water resources (tap water supply driven by solar water pump installed by NGOs)</td>
<td>No household has access to improved water systems.</td>
</tr>
<tr>
<td></td>
<td>Women usually spend up to 3 hours daily collecting water</td>
<td>Women usually spend more than 3 hours daily collecting water</td>
</tr>
<tr>
<td></td>
<td>Use pond/ river/ canal water for washing purposes.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Harvest rainwater, which they use in the next 2-4 months as drinking water</td>
<td>Harvest rainwater, which they use in the next 1-2 months as drinking water</td>
</tr>
</tbody>
</table>
pots of water; sometimes, they must wait in a queue to fetch the water because of the scarcity of fresh water (drinking) sources. As shown in Table 2, Munda women regularly have to walk up to 5 (five) km. In comparison, non-ethnic women walk up to 3 (three) km to the nearest water source, which is physically stressful and often results in chronic pain and related problems. In some cases, women and adolescent girls are also harassed by boys and men while on their journey to collect drinking water. Male members of a family only engage themselves in collecting water only when their women are ill, although in the rainy season they preserve rain water from the roof. Excessive rainfall in the rainy season also triggers flooding of the natural water sources (e.g., the ponds), which declines the water quality by contaminating saline water in the ponds. In comparison to gender and ethnicity, men from the ethnic community have no fresh water source available within household except the rain water harvesting (preserved/ collected rain water) while men from the non-ethnic community have available water sources such as ponds, pond sand water (PSF), deep tube well etc. Nevertheless, women in the ethnic community have less access to water resources compare to women from the non-ethnic community.

4.5.3 Women's Participation in Decision making

Women's status in the family and community is an important social feature often measured through participation and decision-making ability. Better status (social & economic, healthy, etc.) of women helps them actively participate in economic activities, manage households and reduce vulnerability and risk of climate change and disasters. It also helps them with disaster preparedness, planning, coping and adaptation to climate change. Our study finds that women with better status, even in poor and uneducated households, have a better understanding and try to send their children to school for education. At the same time, we find that women have limited engagement in community forums while men have greater involvement and decision-making power in the community. Thus, men in traditional communities are likely to have more influence over planning and decision-making from the family to the local governance promoting policies and programs that may not support women’s rights and priorities or that of ethnic minorities. Our data shows that women (15%) employed and earning family members have comparatively stronger voices within families and are often interested in participating in community-level decision-making. Yet, in most cases, women are less likely to participate in the community and institutional decision-making process. At the same time, most women in these communities have traditional knowledge that can inform adaptation efforts and
climate change & disaster-related information and communication. New and old information is important in adapting to climate change.

The analyses of the collected information from the interviewed women groups in the ethnic and non-ethnic communities demonstrate that women are under-represented in decision-making, especially regarding financial assets within the family and the community. Specifically, women’s participation in planning and decision-making for water management and disaster preparedness within a community and even a larger forum is negligible (33%) in the case-study communities. Women, mainly from the non-ethnic community, report that there are also family disputes, which badly affect their livelihoods since they do not have much negotiation power inside a family. There is almost no freedom for a woman (both in the ethnic and non-ethnic community) to participate in social organizations (such as social welfare, cultural and religious institutions etc.) and contribute to a community at large without prior permission from a male family member.

In the ethnic minority group (Munda), women have much more power to participate in family decision-making. Many ethnic households tend to adopt a female-led system where women dominate family decision-making due to the passive role of men, who sometimes have fewer chances to find jobs and are prone to alcoholism. Yet, outside the family circles, ethnic women still face the same problems as other women: the social pressure for women to collect water in unfavourable conditions impacts their social status (because they are women and from ethnic communities). The decision-making power of ethnic households, in general, is complicated by the absence of any land and these communities’ predetermined lower social status. Thus, ethnic people rarely get any chance to enter any social organization and are heavily underrepresented in the study areas. This is noticeable that they have no representation in the local government by-election. They have little participation in the school committee and other social and religious institutions where most non-ethnic people participate. We find some exceptional cases regarding participation in the NGOs (non-Governmental Organizations) activities, where ethnic and non-ethnic people have given similar preferences to form committees and for the decision-making process within the study areas.

4.5.4 Freedom of Mobility and Migration

As Climate change exacerbates the adverse consequences for coastal areas in Bangladesh, the question of whether it can successfully adapt becomes vital. Naturally, migration is seen as one of the adaptation options. Here we report the realistic migration opportunities local people in coastal communities face. As before, we differentiate between genders and ethnic groups to uncover cultural
Table 4.3: Decision-making Power of Women in Traditional and ethnic communities

<table>
<thead>
<tr>
<th>Gender</th>
<th>NON-ETHNIC community</th>
<th>ETHNIC (MUNDA) community</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEN</td>
<td>Final decision taken by men (if a man is present)</td>
<td>It depends on the family: if women are educated and men are not, then women take decisions</td>
</tr>
<tr>
<td></td>
<td>Income- and expenditure-related decisions are taken by a man in the family (if present)</td>
<td>men and women jointly take financial decisions</td>
</tr>
<tr>
<td></td>
<td>Men are the bread-earners in the family and dominate the decision-making process.</td>
<td>Both men and women earn and take decisions jointly.</td>
</tr>
<tr>
<td>WOMEN</td>
<td>Have no/ less income (fish fry collection, seasonal labour etc.) and have less voice in any decision making</td>
<td>Own income sources (mostly day labour). Often a woman is the bread-earner in the family.</td>
</tr>
<tr>
<td></td>
<td>Even women-headed household delegate decisions to men in the family (e.g. an older son in the family)</td>
<td>Both men and women earn and take decisions jointly, but sometimes women dominate the decision-making process.</td>
</tr>
<tr>
<td></td>
<td>No own savings (except for women who have access to microcredit facilities)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Men of the family take investment decisions</td>
<td>men and women both take investment decisions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Women keep the cash/ income of the family.</td>
</tr>
<tr>
<td></td>
<td>Women have less influence in household decisions regarding the sale/purchase of belongings and assets.</td>
<td>Women have more influence in household decisions regarding the sale/purchase of belongings.</td>
</tr>
<tr>
<td></td>
<td>Women's opinions are less valued in the family and community</td>
<td>Women's opinions are highly valued in the family but less in the community</td>
</tr>
</tbody>
</table>

and social reasons that may inhibit this adaptation option. Given the perspectives discussed in sections 4.1-4.3, we further reflect on whether freedoms of choice from the Sen’s perspective can be exercised at all.

Women (both-ethnic and non-ethnic communities) face many cultural prohibitions and lack access to information and services, all imposing restrictions on mobility. Mobility is also inversely correlated with vulnerability (Figure 1). We found women have comparatively less representation in income-generating activities outside their homestead in the coastal regions of Bangladesh, which is mostly linked to their limited or restricted mobility. There are social and cultural limitations for women (especially for non-ethnic) since employment and employment outside their household is not widely
socially acceptable. However, the tradition is changing, and we find some poor and marginalized women in the communities, especially women from the women-headed household taking part in livelihood-earning activities such as doing small businesses and working with men workers. The difference is that they have no other option other than go out and find work for their daily lives. But ethnic women are taking part in outside employment in farming and off-farm sectors and taking the places of their male counterparts. Our study finds that both men and women are engaged in diversified employment activities, primarily men who go for seasonal or temporary migration. The diversity of livelihood options is vital for the local people in the study area since depending on one particular employment option is dangerous due to the uncertainty imposed by adverse CC impacts. A choice to undertake, e.g. a seasonal migration, is driven by the need to diversify income sources. Temporary and permanent migration is a process shaped by various pull and push factors, a discussion of which is outside the scope of this article. Here we focus on uncovering gender and culture-specific aspects that may hinder or inflate individual freedoms of choice from the perspective of Sen’s capability approach.

Several conversion factors impact individual capability sets from Sen’s perspective. In particular, on the personal level, most people in the ethnic community have low education levels and are not proper according to the diversity of occupations and income opportunities. Women are sometimes overburdened with additional responsibilities when male members of a family migrate or go to distant places to earn for their families’ subsistence. In general, women – both in ethnic and traditional communities – often have limited networking and training opportunities for enhancing knowledge in certain areas and building their capacity. In Bangladesh’s patriarchal and Muslim-dominated societal system, women often have limited networking and leadership scope. Panday (2013) also finds that further inventiveness is still needed to ensure women’s economic, social, and personal freedom. Yet, currently, women’s freedom of choice is limited to the extent that they still do not have control over how to spend their earnings or even their mobility. Despite the societal changes in recent years for several development and educational interventions from government organizations and NGOs, many women still have not been allowed to leave the house alone. It includes going outside their own house to participate in a forum or to maintain relationships among individuals and groups, which results in women still lacking proper information and communication possibilities on reducing their vulnerability and risk to CC impacts. Women in both ethnic and non-ethnic communities do not have access to the same health, education and income opportunities as men in the community have. The challenges obstructing women's mobility, such as inequality in social status, decision-making power, access to information and networks and social stigma for some livelihood options, call for a change to make the
conditions favourable for women to have the freedom to access goods and services that assure their well-being in the state.

Table 4.4: Gender and ethnicity characteristics of Mobility: invisible ceilings on Freedoms

<table>
<thead>
<tr>
<th></th>
<th>NON-ETHNIC community</th>
<th>ETHNIC (MUNDA) community</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education</strong></td>
<td>Bangla (no problem in communication if travelling within the country)</td>
<td>Ethnic language, limited to a small community, everyone cannot communicate well in the Bangla language.</td>
</tr>
<tr>
<td><strong>Employment</strong></td>
<td>i. No discrimination in wages</td>
<td>i. Discrimination in wages and labour distribution based on ethnicity</td>
</tr>
<tr>
<td></td>
<td>ii. Diverse sources of income and varieties of work, including self-employment</td>
<td>ii. Mostly sell their labour daily to seasonal agriculture &amp; fisheries activities</td>
</tr>
<tr>
<td></td>
<td>iii. Usually, migration is only in off-agricultural seasons</td>
<td>iii. Can migrate all year round</td>
</tr>
<tr>
<td><strong>Migration</strong></td>
<td>Mostly migrate individually &amp; sometimes, seasonal migration often in groups (for example- group migration for seasonal labour in brick kilns)</td>
<td>Always migrate in groups (10-20 people in a group). Usually, seasonal migration Send one man from the group to deliver money to families and get feedback on their family situation.</td>
</tr>
<tr>
<td></td>
<td>Migrate usually for over half a year and send money through a mobile phone banking system.</td>
<td></td>
</tr>
<tr>
<td><strong>Agriculture</strong></td>
<td>Have land tenure</td>
<td>No land ownership/ leased land only</td>
</tr>
<tr>
<td><strong>Access to local governance systems and institutional services</strong></td>
<td>Comparatively, more services were received because of the dominance and leadership (for example, VGD/vulnerable group feeding for the extreme poor)</td>
<td>Comparatively, services received because of less participation at the institutional level (for example, VGD/vulnerable group feeding for the extreme poor) No representation in local governmental institutions (union councils, sub-districts etc.)</td>
</tr>
<tr>
<td></td>
<td>Good representation in local governmental institutions</td>
<td></td>
</tr>
<tr>
<td><strong>Network</strong></td>
<td>Rich local network and social ties in neighbouring cities also across the entire country</td>
<td>Only local networks and social ties with the same ethnic groups in other sub-districts</td>
</tr>
<tr>
<td><strong>Security</strong></td>
<td>Free to mix with everyone and migrate individually</td>
<td>Socially suppressed, afraid to be alone, migrate within a large group</td>
</tr>
<tr>
<td><strong>Share of pursuing seasonal or permanent migration</strong></td>
<td>Large and permanent</td>
<td>Small and seasonal</td>
</tr>
</tbody>
</table>

70
The current study addresses the gap by assessing perceptions of climate change issues, freedom of choice and adaptation options of various social groups differentiated by gender and ethnicity among Bangladesh’s poorest southwest coastal communities. The study has shown significant differences in gender and ethnic identity. Women from ethnic and non-ethnic communities are comparatively more vulnerable in the study areas of the southwest coastal sub-districts. They are living in different geophysical settings and socio-economic conditions. They have low literacy, less access to the health system, high unemployment and poverty, and climate change’s negative impacts on their lives and livelihoods. Compared to men, women have less participation in decision-making and less access to mobility and information. Though, this is always important to have a balanced representation of women and men in all decision-making processes that guarantee better government and a unique perspective (the European Network of Experts, 1997, p.8). Mobility is also inversely correlated with vulnerability (Figure 1): lack of mobility makes people vulnerable and exposed to climate change

### 4.6 Conclusion

<table>
<thead>
<tr>
<th>WOMEN</th>
<th>NON-ETHNIC community</th>
<th>ETHNIC (MUNDA) community</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education</strong></td>
<td>No language problems and schooling rate is higher than in ethnic women</td>
<td>Language problem, not familiar with Bangla. The schooling rate is lower than non-ethnic women.</td>
</tr>
<tr>
<td><strong>Employment</strong></td>
<td>i. Gender discrimination in wages and labour distribution ii. more sources of income and varieties of work than ethnic women, including self-employment</td>
<td>i. Ethnic &amp; gender discrimination in wages and labour distribution ii. Mostly selling their labour daily to seasonal agriculture &amp; fisheries activities</td>
</tr>
<tr>
<td><strong>Migration</strong></td>
<td>Temporary migration to the cities as household workers and garments factories</td>
<td>Women migrate only in cases of full-family permanent migration.</td>
</tr>
<tr>
<td><strong>Agriculture</strong></td>
<td>Their families have land tenure, and women do homestead agriculture (home gardening)</td>
<td>Mostly live on leased and charity land (given by faith-based organizations) and have limited home-garden opportunities.</td>
</tr>
<tr>
<td><strong>Access to institutional services</strong></td>
<td>Have institutional access and leadership representation (in the local government institutions)</td>
<td>Limited and almost no institutional access and representation (in the local government institutions)</td>
</tr>
<tr>
<td><strong>Network</strong></td>
<td>Rich local network and social ties in neighbouring cities also across the entire country</td>
<td>Only local network (within the community) and social ties with the same ethnic groups in other sub-districts (upazila)</td>
</tr>
<tr>
<td><strong>Security</strong></td>
<td>Women feel more secure because of large community networks</td>
<td>Women feel less secure or insecure because of an isolated community, socially suppressed</td>
</tr>
</tbody>
</table>

4.6 Conclusion

The current study addresses the gap by assessing perceptions of climate change issues, freedom of choice and adaptation options of various social groups differentiated by gender and ethnicity among Bangladesh’s poorest southwest coastal communities. The study has shown significant differences in gender and ethnic identity. Women from ethnic and non-ethnic communities are comparatively more vulnerable in the study areas of the southwest coastal sub-districts. They are living in different geophysical settings and socio-economic conditions. They have low literacy, less access to the health system, high unemployment and poverty, and climate change's negative impacts on their lives and livelihoods. Compared to men, women have less participation in decision-making and less access to mobility and information. Though, this is always important to have a balanced representation of women and men in all decision-making processes that guarantee better government and a unique perspective (the European Network of Experts, 1997, p.8). Mobility is also inversely correlated with vulnerability (Figure 1): lack of mobility makes people vulnerable and exposed to climate change.
impacts (IPCC, AR5, 2014). The result of the study shows that the vulnerability to climate change stresses may vary because of the gender and ethnicity of the individuals. Adaptive capacity is also an issue for these individuals since the ability to adapt depends on wealth, social status, power (& networking) and wealth. Access to resources, opportunities, and freedom in decision-making in the context of CC adaptation at the family and community level requires information and communication at all levels, which is limited for women (in both ethnic & non-ethnic people) in the coastal region of Bangladesh.

More research is needed to understand how combined gender and ethnic differences may amplify the inability to develop a longer-term climate adaptation strategy (e.g. is it universal across various regions?) may shed light on the barriers to CC adaptation (Mersha & Laerhoven, 2016) and breaking the positive feedbacks in trapped population. Studies on CC impacts often assume that if conditions become unlivable, then climate-driven forced migration is to be expected. However, this fieldwork reveals that layers of actors can prohibit even forced migration, leaving whole communities trapped in an unfavourable environment. Or is it feasible so that if one accounts for gender and ethnic barriers, we have a better understanding of which section of the population can undertake migration as an adaptation option?

4.6.1 Acknowledgements

I’m very much thankful to the community people for their time and information and cooperation in information collection. Special thanks to the Ethnic (Munda) leaders in the community who helped during the focus group discussions and to Sundarban Adibasi Munda Sangstha (SAMS) for providing the necessary information for this study.
4.7 References of Chapter 4


UNFCCC. Secretariat. (2022). *Dimensions and examples of the gender-differentiated impacts of climate change, the role of women as agents of change and opportunities for women.* UNFCCC.


CHAPTER-5: FREEDOM OF CHOICE TO MIGRATE: ADAPTATION TO CLIMATE CHANGE IN BANGLADESH

5.1 Abstract

Adaptation is an essential part of climate change policy. In areas where impacts are likely to be severe, migration is considered to be an adaptation option. In Bangladesh's coastal areas, migration due to climate change is contingent on people’s freedom of choice at individual and household levels. Following Amartya Sen’s capability approach, we argue that a line should be drawn between free choice migrations versus forced migration. Sen’s capability approach focuses on the importance of people’s freedom of choice to act and the ability to achieve what they consider valuable in their life.

In this paper, we use extensive empirical work engaging 22 focus group discussions (8–12 individuals in each group) and 14 Key Informants Interviews in South-West Bangladesh to elicit how freedom of choice changes with an individual's economic class and social status. Using these data, we apply Sen’s capability approach to understand the role of the freedom of choice when considering migration as an adaptation option. We argue that the capability approach is essential in revealing a thin border between migration as a (planned) adaptation option and forced migration.

Keywords: climate change, migration, freedom of choice, livelihood, economic class

5.2. Introduction

Migration is a complex decision influenced by many factors, with climate-related environmental change being just one of them. It can be seasonal, temporal and permanent, and there is a delicate balance between the push and pull dynamics that trigger a migration decision. Motives range from making a free choice in a search for better opportunities to being forced by complete loss of livelihood, for example, because of cyclone damage or seawater inundation. Yet, freedom of choice has received

little attention in climate adaptation literature. This paper uses the ‘capability approach’ of Amartya Sen to provide a framework to investigate the attributes that people who consider migrating may either have or lack. According to Sen, an individual’s capability depends on their ability to choose and achieve the functioning they need to live a life they have reason to value (Sen, 2000; Robeyns, 2005). They need access to basic resources, including food, employment, social networks, education and mobility, to realise their capabilities. A functioning human life depends on a good environment, socio-economic, political and personal conversion factors, and human, physical and financial capital (Nambiar 2013). Freedom of choice is intrinsically valuable to people as it allows them to achieve their destiny as a person and as part of relevant communities (Alkire 2009). We develop a decision pathway showing the nodes where people make migration decisions. The pathways can be used to implement better mitigation and adaptation actions designed to help people affected by climate change in the coastal communities in Bangladesh.

Bangladesh is densely populated, with 163 million people living in a land area of 147,570 km² and an average annual rate of population growth of 1.2% (UNFPA 2016). It is also disaster-prone, with a high risk of cyclones and floods (IPCC AR5; IPCC 2014; Maplecroft 2011; Shaw and Mallick 2013; Islam et al. 2014; Parry 2007). One-third of the country has an average elevation of 4-6 meters above mean sea level. This land floods during the monsoon and is susceptible to tidal inundation (SRDI 2010; World Bank 2015). Sea level rise threatens infrastructure, livelihoods, food production and access to drinking water. Millions of people are at risk of becoming climate migrants from low-lying areas, putting pressure on land and resources in other parts of Bangladesh (MoEF 2009; McAdam 2011; Mahmood 2012; World Bank 2010). However, not all migration is forced; it is also a general coping strategy to reduce livelihood vulnerability, increase livelihood resilience and improve well-being, especially in rural areas (Mallick 2011).

We use Sen’s capability approach as an analytical framework to explore how different dimensions of freedom of choice are associated with migration as an adaptation option. The paper seeks to address the following two research questions: how do pull and push migration factors differ among various socio-economic groups, and where is the border between migration as an adaptation option and forced migration? We synthesise data collected in a questionnaire survey during 2014-2016 in Bangladesh and analyse responses from 22 focus groups of 215 individuals who differ in gender, age and occupation. The paper treats freedom of choice explicitly when studying climate-driven migration as a path between an individual’s socio-economic condition and their achieved functioning. The
framework emphasizes the conversion factors that affect an individual’s ability to achieve their functioning and freedom of choice based on individual capabilities. The analysis results are used to formulate decision pathways that can be used to plan mitigation and adaptation actions better. The following section outlines the conceptual framework and presents the migration decision through the lens of Sen’s capability approach. Section 3 presents the details of the study area and methodology. The results are in Section 4, and the conclusions are in Section 5.

5.3 The Capability Approach and Climate Change Migration

Amartya Sen’s capability approach framework evaluates socio-economic arrangements based on the extent of freedom of choice to achieve the functioning necessary to lead a life an individual wants to value (Sen 1999:75; Alkire 2002). Sen does not advocate a particular concept of a good life but emphasizes the importance of freedoms that each individual can exercise concerning the options that matter most to her or him. Human development is thus the expansion of the range of genuine freedoms and choices for each individual; human well-being should be assessed in the light of an individual’s social, economic and political environment (Mizohata 2011). The global environment is changing, and migration is one possible adaptation option under climate extremes. Yet, not all individuals have access to the same choices. Bangladesh has high-income inequality, determined by individual access to resources and services and various social and economic conditions. This inequality affects people’s ability to migrate as a climate adaptation option.

Planned migration in response to climate change-related stresses is a potential adaptation strategy (Alarcón et al. 2011). It may be the most effective way for people to diversify their income and build livelihoods resilient to climate change and other environmental threats (Black et al. 2011; Kartiki 2011). Although migration is considered one of many adaptation options, it is not always available as a free choice for all individuals in a population vulnerable to adverse climate change impacts. This paper applies Sen’s capability approach framework (Sen 1999) to study individual migration decisions of individuals with varied entitlements (Box I in Figure 1), which are shaped through a set of conversion factors (push and pull, see Box II; Black et al. 2011), potential capability set (Box III) and freedom of choice (Box IV). In the capability framework, the focus shifts from current achievements (functionings, Box V; Sen 2000; Robeyns 2005), which can be seen as an outcome of an individual decision to migrate or to stay, to a process that a person undergoes given his/her capability set and ‘freedom’ to make choices. A capability set depends on individual entitlements and conversion factors (Sebastianelli 2015). For example, income is the means but not the end; neither is it a sufficient measure of capability. Different people have different income requirements within and across
societies, and higher levels of income and wealth do not always result in higher levels of well-being (Nussbaum & Sen, 1993; Saito, 2003). We used the conceptual framework in Figure 1 as the basis for the fieldwork design and reporting of the results. The paper approaches climate-driven migration as a path between socio-economic conditions and achieved functioning while explicitly considering freedom of choice.

The relationships between different patterns of migration (seasonal, temporary or permanent) and the factors that influence and impact the decision of individuals, communities and societies, who either choose or are forced to migrate, is an important topic for research in a changing world (Morton et al. 2008). These factors include personal characteristics (level of education, age, gender, physical health state), socio-economic characteristics of an individual’s household (household head, size and financial ability etc.) or the nature of the community (availability of vital infrastructure such as schools, hospitals and other social institutions), and finally living and environmental conditions (Figure 1, Box II).
Climate change migration through the lens of Sen’s capability approach: a conceptual framework

**Figure 5.1:** Climate Change (CC) migration and Capability approach framework understanding the relationship between CC effects & capability approach
5.4 Methods and Data

Data were collected in the field during the period March 2014- June 2016 from 22 focus groups (8-15 individuals in each group), with 215 individuals in total, in four coastal Upazila (sub-districts) in South-East Bangladesh (Figure 2). These sub-districts are among the main areas of origin for people migrating to Khulna and Dhaka cities, the central destination points for migrants from this region in Bangladesh. We chose these four sub-districts because they experience socio-economic problems such as unemployment and poverty and are exposed to various climatic and natural hazards, including floods, cyclones, storm surges, salinity intrusion, and waterlogging (CDMP II 2014). In the study areas, two recent severe cyclones, Sidr in 2007 and Aila in 2009 had major impacts on lives and livelihoods. Sea level rise is a chronic effect of climate change and represents a long-term and structural threat. We assumed that by conducting interviews on these sites, it would be possible to encounter people who had migrated for various reasons, including slow-onset climate impacts and sudden disasters. The interviews involved key informants, local government organizations, NGOs and local leaders in the four sub-districts. Respondents were selected following random sampling and stratification by wealth distribution (land ownership, non-land assets etc.) and occupation of the respondents.

Figure 5.2: Map showing study areas (red marked) in the coastal districts of Bangladesh

Data collection methods included observation transects, Focus Group Discussions (FGD) and Key Informant Interviews (KII) using Participatory Poverty Assessment exercises (Chambers,
The FGDs (N=22, 8-15 individuals in each group) were conducted with male, female, elderly and ethnic people and covered several occupational groups (farmers, fishermen, non-timber forest resources collectors, petty traders). In the study areas, people are more or less dependent on the largest mangrove forest, the Sundarbans Reserve Forest. The discussions included sharing general information about the area, people’s living and livelihood options, environment and climate changes, recent disasters, the impacts of past severe disasters and the understanding of poverty and alternative options.

The PWRs were conducted according to criteria presented by the community/village people and were used to create the categories of households. The households were then divided into extreme poor, poor, medium poor, medium rich and rich. The participatory approach reflected the views and perspectives of poor people themselves in defining poverty (Chambers 1994a; 1994b pp. 17-18; 2002). This included socio-economic conditions of households and their living standards, income, household landholding size, number of people, education level, occupation, access to health issues, house condition (construction) and household assets. The major advantage of the PWR is its departure from externally imposed standards of poverty. It allows people with low incomes to prioritize the dimensions that affect them and then offer solutions (Qizilbash, 2004).

The observations made during the fieldwork helped obtain insights into climate change’s impacts and migration issues. The KIIIs (N=11) covered climate change and environmental management issues. KIIIs were conducted with key informants, including university teachers (Khulna University), policymakers, government and non-government officials, and the union council chairman. The KII provided additional detailed insights for triangulating the focus group discussions and understanding local and regional climate change and migration issues in the study areas.

Most of our focus group participants were female (more than 70%) and included 10-12% female-headed households, primarily due to the migration of male family members and family breakdown. The respondents were asked about their family decision-making to understand their households' reasoning when facing disasters. We also interviewed community leaders, and NGO workers engaged with climate change-related interventions in their areas. The average age of the respondents was reported to be 45 years (minimum 17 and maximum 85 years). The main occupation types in our study area are fishing (60% of full-time and part-time jobs), farming labour and non-farm labour such as earth cutting and brickfield workers. This contrasts with the migrated population, whose primary jobs are mostly rickshaw-van pullers (approximately 65%), petty traders and non-farm labour for males, household workers (65%), and ready-made garment factories in Dhaka for females.
Figure 5.3: Impact of sea level rise in Bangladesh (Source: Dhaka University and IPCC; https://www.grida.no/resources/5648)
5.5 Result and Discussion

Our fieldwork reveals different patterns of migration. Firstly, there are several types of migration: seasonal, temporary, permanent, and forced or planned. Secondly, it can be an individual, a household head, an income-earning member, or an entire family who migrates to nearby cities, particularly Dhaka. Some migrants also go temporarily to neighbouring countries (with or without proper documentation) to earn their livelihoods incomes. Thirdly, various push and pull factors may be behind a migration decision, varying across different socio-economic groups. Table 1 lists the most common push and pull factors influencing individual migration decisions reported by the respondents. In most cases, non-climatic factors that cause a loss of livelihood and options to earn at least any income are the main factors for migration, yet, overall environmental change acts as a catalyst for migration.

Figure 5.4a: Local transportation is often overwhelmed with the flow of rural-urban migrants, even causing people to use buses roofs. (Photo: Author)
As with any relocation decision, migration is driven by a complex interaction of three factors (Table 1). Both push and pull factors, which either trigger migration or stimulate people to stay, are not static. They change with seasons, climate variability, and individual life events. In general, a migration decision is costly in terms of financial costs and loss of social capital. Thus, households carefully consider a decision on permanent migration and often move gradually through other seasonal and temporary migration types. A combination of factors triggers each type of migration. Results from the discussions show that people choose to migrate only when push factors dominate. The question is whether there are regularities in what factors are the key drivers of a specific type of migration. Black et al. (2011) identify five drivers of migration: economic, political, demographic, social and environmental, arguing that it is not one driver that triggers a decision to migrate but the interaction of five drivers. Table 1 illustrates that the migration drivers are the capability approach conversion factors.
**Table 5.1**: Push and pull factors (information collected through Focus Group Discussions, N=215 respondents in total)

<table>
<thead>
<tr>
<th>Conversion factors</th>
<th>Push</th>
<th>Type of migration</th>
<th>Conversion factors</th>
<th>Pull</th>
<th>Type of migration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>Skills/ training</td>
<td>T &amp; P</td>
<td>Individual</td>
<td>Access to better healthcare</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>higher education</td>
<td>T &amp; P</td>
<td></td>
<td>Access to better education</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>Marriage</td>
<td>P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socio-economic</td>
<td>Poverty</td>
<td>S, T &amp; P</td>
<td>Socio-economic</td>
<td>Better livelihoods</td>
<td>S, T &amp; P</td>
</tr>
<tr>
<td></td>
<td>Unemployment</td>
<td>S &amp; T</td>
<td></td>
<td>Higher-income possibilities</td>
<td>S, T &amp; P</td>
</tr>
<tr>
<td></td>
<td>Indebtedness</td>
<td>S, T &amp; P</td>
<td></td>
<td>Building network and strength</td>
<td>T &amp; P</td>
</tr>
<tr>
<td></td>
<td>Socio-political reason (security, protection &amp; participation)</td>
<td>T &amp; P</td>
<td></td>
<td>Protective security</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Better Living Condition</td>
<td>P</td>
</tr>
<tr>
<td>Environmental &amp; Physical</td>
<td>Flood</td>
<td>S &amp; T</td>
<td>Environmental &amp; Physical</td>
<td>Less exposure to hazards</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>Cyclone</td>
<td>S, T &amp; P</td>
<td></td>
<td>Better communications</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>River bank erosion</td>
<td>P</td>
<td></td>
<td>Free land for settlement</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>Tidal surge</td>
<td>S &amp; T</td>
<td></td>
<td>Available shelter</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>Shelter</td>
<td>T &amp; P</td>
<td></td>
<td>Better infrastructure</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>Salinity</td>
<td>S &amp; T</td>
<td></td>
<td>Livable environment</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>Drought</td>
<td>S &amp; T</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Notations: S=Seasonal; T=Temporary; P=Permanent;*
In most cases, seasonal (S) and temporary (T) migration are observed when attempting to secure livelihood, income, and social-political and environmental security. People prefer seasonal and temporary migration because of their social attachments and household assets. Seasonal migration is a common income diversification strategy and a standard livelihood option in the study area. The focus group discussions reveal that there has to be a disturbance to the normal way of life to cause temporary migration. It often occurs after a hazard event that is more severe than usual. Permanent (P) migration is an extreme measure. It is usually observed in two different situations, firstly when people lose their permanent settlements after sudden on-set disasters (severe natural disasters, like cyclones, river bank erosion, etc.), which act as push factors. Secondly, in search for better opportunities and under expectations of better lives and livelihood, which act as pull factors. While there is a balance of these factors that may eventually lead to a decision on whether to migrate, not all have the same weight for our respondents. During the focus group discussions, we asked the respondents to identify and rank these preventive and stimulating factors (see Table 2).

As Brown (2008) noted, push and pull factors of migrations are often highly subjective. Our data shows that migration's push and pull factors differ from place to place across individuals, communities and regions. Drivers of migration also vary across different socio-economic groups (see supplementary information). Individual entitlements (Box I in Figure 2) define whether economic factors outweigh others in a set of conversion factors (Box II) when defining an individual's capability sets (Box III). Socio-economic factors are one of the main conversion factors included in the push and pull factors that influence migration (Box II in Figure 1). These include unemployment, income possibilities and socio-economic security. Considering the potential capability set (Box III), an individual can have a secure and steady income and resilient livelihood as achieved functioning (Box V). Yet, even given the conversion factors of the individuals, the achieved functioning is influenced by freedoms of choice (Box IV). Our FGDs demonstrate that social capital and level of community involvement vary significantly among economic classes. As might be expected, the rich possess an ability to provide sufficient, or good quality, food and shelter, better schooling, health care and other necessary factors of family well-being. They usually have more durable assets than other economic classes, making them more resilient to climate change variability and hazards.
Table 5.2: Factors that prevent migration, information collected through FGD
(22 FGD = 215 respondents)

*Preventive factors (factors that prevent migration) that consider people to stay*

<table>
<thead>
<tr>
<th>Preventive Factors</th>
<th>Ranked (according to FGD respondents)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Secure and steady income/ livelihood (Availability of alternative livelihood options)</td>
<td>1</td>
</tr>
<tr>
<td>2. Agricultural land (fertile, multi-cropping etc.)</td>
<td>3</td>
</tr>
<tr>
<td>3. Hazard-free homestead (above flood level etc.)</td>
<td>2</td>
</tr>
<tr>
<td>4. Small family size (food security, good health etc.)</td>
<td>8</td>
</tr>
<tr>
<td>5. Lack of network (or no network outside the community/ region)</td>
<td>4</td>
</tr>
<tr>
<td>6. Social liabilities (especially the religious leaders, teachers, doctors, local institutional leaders, etc.)</td>
<td>9</td>
</tr>
<tr>
<td>7. Fear of an insecure future (lack of information and knowledge)</td>
<td>5</td>
</tr>
<tr>
<td>8. Financial incapability (not able to start a new living)</td>
<td>6</td>
</tr>
<tr>
<td>9. Physical inability (disability, no outside support available etc.)</td>
<td>7</td>
</tr>
</tbody>
</table>

The middle economic class can also provide food and bear educational, healthcare, clothing and other expenses for family members. This economic class has moderately durable houses, which need repairs or renovation every 2-5 years. The country generally has two types of middle-class population: lower middle class and upper middle class. Both middle classes have been experiencing shrinking income levels in recent years. Gradual environmental degradation and other conversion factors unbalance their status, stimulating migration decisions, especially in the lower middle-class population that has just fallen below the poverty line. The lower-middle class also experiences decreased consumption expenditure and difficulties maintaining quality of life.
The poor or chronically poor economic classes are below the poverty line, live in poverty for longer and cannot afford expenses for the basic needs of their family members. Their housing conditions are not hygienic and often require rebuilding every year or two. They have poor asset bases, weak social networks and higher vulnerability to poverty. Low-income people live with low economic activity, low productivity, and no employment opportunities. They report serious economic and social problems in their original location and often choose to migrate, often for long distances. There is very little holding them in their place of origin.

The main attributes of different socio-economic groups in the study area are summarized in the supplementary information and are divided into five economic classes. The ‘rich’ migration is temporary for higher and better education, better health care and better jobs leading to surplus wealth. The ‘middle-class’ migration is mainly for income generation activities and access to better health, education and security services. For the ‘lower middle-class/ moderate poor’, migration is mainly for income generation; once their savings reach their target, they return to their village to be with their family. The ‘poor’ are pushed out for subsistence, so migration is unplanned and can be temporary or permanent. The ‘extreme poor/ destitute’ are pushed out for subsistence, so migration is unplanned and can be temporary or permanent.

When matched with the push and pull migration factors in Tables 1 and 2, the differences in triggers of migration decisions per income class become clear. As such, each socio-economic group, given its relative entitlements (Box I in Figure 2) and a set of conversion factors to which it is exposed (Box II), has a different propensity for one of the types of migration (seasonal, temporal or permanent). Yet, independent of income class, a threshold needs to be crossed to push people to migrate because, with all things equal, people would prefer to maintain their normal way of living. For better access to health and education opportunities, the rich and the middle economic class tend to migrate based on a plan (planned permanent migration) to achieve health and education well-being (Box V). In contrast, the other three economic classes put effort into achieving relatively secure livelihoods. They often choose seasonal and temporary migration to support their daily lives. Only when a sudden onset disaster occurs, do they choose sudden and unplanned migration, which can be temporary or permanent. Poverty is an agent of capability deprivation (Sen 2000); this concerns income and an obstacle to achieving one’s capabilities. Thus, while a particular population might be exposed to the same environmental factors, vulnerability varies among different socio-economic groups deciding to stay or migrate, either a free choice for a better future or a forced outcome.
Table 5.3: Categories of different households that are vulnerable and exposed to climate change migration

<table>
<thead>
<tr>
<th>Themes</th>
<th>Wealth/ Income Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rich</td>
</tr>
<tr>
<td>Ownership of available land</td>
<td>&gt; 10 bigha</td>
</tr>
<tr>
<td>Shelter</td>
<td>-tin/ brick-roofed good quality houses (Tin: corrugated galvanized iron (CI) sheets)</td>
</tr>
<tr>
<td>Non-land assets</td>
<td>-deep/shallow tube-well -cattle-goat -poultry/Duck -drought power -Sanitary latrine -other durable and luxurious items (TV, Radio,</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Refrigerator, motorbike etc.)</td>
<td>- produce surplus</td>
</tr>
<tr>
<td></td>
<td>- produce own consumption needs (never have food deficits)</td>
</tr>
<tr>
<td></td>
<td>- occasional shortage of food</td>
</tr>
<tr>
<td></td>
<td>- frequent shortage of food</td>
</tr>
<tr>
<td>Food Security</td>
<td></td>
</tr>
<tr>
<td>Cash Flow</td>
<td>- produce surplus</td>
</tr>
<tr>
<td></td>
<td>- could save a handsome amount</td>
</tr>
<tr>
<td></td>
<td>- receive remittance</td>
</tr>
<tr>
<td></td>
<td>- lend to others</td>
</tr>
<tr>
<td></td>
<td>- multiple sources of cash income</td>
</tr>
<tr>
<td></td>
<td>- earn surplus</td>
</tr>
<tr>
<td></td>
<td>- participation in NGOs</td>
</tr>
<tr>
<td></td>
<td>- inadequate working capital</td>
</tr>
<tr>
<td></td>
<td>- little savings</td>
</tr>
<tr>
<td></td>
<td>- borrow from others</td>
</tr>
<tr>
<td></td>
<td>- no surplus</td>
</tr>
<tr>
<td></td>
<td>- no savings</td>
</tr>
<tr>
<td></td>
<td>- have difficulties borrowing from others</td>
</tr>
<tr>
<td>Cash Flow</td>
<td></td>
</tr>
<tr>
<td>Participation in local structure</td>
<td>- dominate in the local power structure/decision making</td>
</tr>
<tr>
<td></td>
<td>- have some influence in the community decision making</td>
</tr>
<tr>
<td></td>
<td>- marginal</td>
</tr>
<tr>
<td></td>
<td>- often the victim of the local power structure</td>
</tr>
<tr>
<td></td>
<td>- invisible</td>
</tr>
<tr>
<td>Participation in local structure</td>
<td></td>
</tr>
<tr>
<td>Schooling</td>
<td>- children going to school (can bear the cost of education of children)</td>
</tr>
<tr>
<td></td>
<td>- send children to school</td>
</tr>
<tr>
<td></td>
<td>- cannot bear the full cost of education (after free primary-level education)</td>
</tr>
<tr>
<td></td>
<td>- cannot afford to send their children to school (except for free primary-level education)</td>
</tr>
<tr>
<td></td>
<td>- children do not go to school</td>
</tr>
<tr>
<td>Schooling</td>
<td></td>
</tr>
<tr>
<td>Other characteristics</td>
<td>- Females can afford to maintain purdah and other</td>
</tr>
<tr>
<td></td>
<td>- small family size</td>
</tr>
<tr>
<td></td>
<td>- hardworking</td>
</tr>
<tr>
<td></td>
<td>- Females have to earn for the family</td>
</tr>
<tr>
<td></td>
<td>- Female-headed households</td>
</tr>
<tr>
<td></td>
<td>- female wage earner</td>
</tr>
<tr>
<td></td>
<td>- Elderly and the disabled</td>
</tr>
<tr>
<td></td>
<td>- widow and the separated female-headed households</td>
</tr>
<tr>
<td>Religious norms</td>
<td>Lack of male income earner in the family, ill health, cannot afford decent clothes, recently formed family, highly vulnerable to seasonality, seasonal migration to cities for employment</td>
</tr>
</tbody>
</table>

| Migration | Migration is temporary and permanent for the sake of higher and better education, better health care and better job with the help of surplus wealth. | Migration is mainly for income generation activities. Other than to access better services in terms of health, education and security. | Migration is mainly for income generation. Once their savings reach their target, they return to their village to be with their family. | Pushed out in search of subsistence, therefore unplanned, temporary or permanent happen. |
According to Sen (2002), a potential capability set (Box III, Figure 2) represents that different people can generate different capabilities to achieve certain functionings from the same distribution of commodities. Sen (1985; 1999) emphasizes that capabilities reflect a person’s real opportunities or positive freedom of choice between possible lifestyles. Freedom (Box IV) has two aspects: the process and the opportunity (Alkire 2002). The process aspect is the ability to act upon what matters; the opportunity aspect is the real opportunity to achieve valued functionings (beings and doings) selected from various good possibilities. Consequently, we argue here that freedom, in this case, is to have the ability to decide whether to migrate or not, and if to migrate, then being able to choose the form of the migration (temporary, seasonal or permanent). It also depends on conversion factors, which affect achieving functioning.

The conversion factors (Box II) are closely intertwined with achieving an individual’s functioning (Box V). They bring individual freedom or exercise of choice into focus. In the study, we find that economic class is one of the criteria that influences an individual’s decision-making strategy for migration, affecting the freedom of choice of migration. The poor migrate in an attempt to reduce their poverty and vulnerability. In contrast, the rich migrate to gain better opportunities for the life they want and have a comparatively free choice of whether to migrate.

Figure 5.5 schematically summarizes the qualitative information collected during the focus group discussions, which discussed how freedom of choice and migration potential depended on the capability set (Robeyns 2006). Based on their capability set, individuals have a choice to stay or migrate based on the freedom of choice, and this decision can be either planned or entirely forced by circumstances. In other words, Figure 3 describes the typical logic of migration decision-making while differentiating between individual entitlements, conversion factors, and the degree of freedom of choice that individuals experience. For example, people can plan to stay when they have a better or higher occupation or medium occupation, suitable shelter in a place with sustainable food security and cash flow, and high social status and participation. Similarly, people can plan to migrate when they have a medium or low occupational level, bad shelter (vulnerable to disaster) and non-sustainable food security with medium assets and social status. Rich and medium-class people have a good chance of having a free choice for a planned migration or not to migrate while maintaining a decent life.

On the contrary, people are forced to migrate when they have a low level of occupational livelihood and non-land assets with low social status and no participation, non-sustainable food security and
vulnerable shelter (B in Figure 3); and in similar circumstances, they are forced to stay in the place of origin. Instead of a free choice, these people – mostly from medium-poor, poor and extremely poor classes – are forced to stay in a vulnerable condition with no choice. The effect of environmental and climate change on household migration decisions is outlined in Figure 3 and illustrates a household’s socio-economic situation. Individual or household migration decisions are affected by a single factor and a combination of multiple personal, socioeconomic and environmental factors (Black et al., 2011). Thus, environmental and climate change stress significantly influences displacement and migration-related decisions (Renaud et al. 2011).

We used the capability approach framework to discern the decision-making strategy within a household (medium poor and poor) on migration (seasonal, temporary, forced or permanent). Seasonal migration (S) occurs when people face environmental and climatic disasters. They try to recover and adapt by borrowing money/ taking loans as micro-credit and increasing income through alternative livelihood options. In such cases, income-earning members (particularly males) also migrate quickly following agricultural seasonality. It is important to note that there are differences in decision-making at the household level when contrasting their normal life and life after a disaster. It is hard to find a sustainable solution for disaster recovery for most poor and middle-income families due to their limited savings and poverty in general (Rahman et al., 2013). They also decide to opt for temporary migration (T) when they have short-term alternative livelihood solutions (for example, fishing, day labour) in the locality, and income-earning members migrate for a short period (usually less than six months) to known places, mostly in the nearby cities.

Based on the data from our focus group discussions, we outline the typical decision paths that lead households towards a particular type of migration: seasonal, temporal or permanent (Figure 5.6) when differentiated by entitlements and prone to various conversion factors. In the study areas, people try to maintain a normal life for their household by taking alternative livelihoods; for example, outside the main agricultural seasons, people try to find non-farm jobs (rickshaw van pulling) to obtain local income. If that is not possible, the main earner of a household migrates temporarily (T) to get work in the brick fields. In the case of temporary migration, a male family member would formerly travel to nearby cities (such as Satkhira and Khulna) to earn a cash income by any means so their families could survive. However, in the past 10 years (mainly after severe cyclone Sidr in 2007), a new trend of young women migrating temporarily to work at ready-made garment (RMG) factories has emerged.
### Potential capability Set
(capability set in current location)
- **Occupation:** H, M, L
- **Shelter:** G, S, B
- **NL Assets:** H, M, L
- **Food Security:** SFS, NSFS
- **Cash flow:** Sust/ non-sustainable
- **Participation:** Y/ N
- **Schooling:** Y/ N
- **Social Status:** H, M, L

### Acronyms:
- **Occupation:** High (H), Medium (M), Low (L)
- **Shelter:** Good (G), Suitable (S), Bad (B)
- **Non-land assets:** High (H), Medium (M), Low (L)
- **Food Security & Cash flow:** Suitable (S), Bad (B), Sustainable (S), Non-sustainable (NS)
- **Participation:** Yes (Y), No (N)
- **Schooling:** Yes (Y), No (N)
- **Social Status:** High (H), Medium (M), Low (L)

### Figure 5.5: Freedom of choice and migration potential depending on the capability set

- **Stay**
  - **Occupation:** H, M
  - **Shelter:** G, S
  - **NL Assets:** H
  - **Food Security:** S
  - **Cash flow:** S
  - **Participation:** Y
  - **Schooling:** Y
  - **Social Status:** H

- **Forced to stay**
  - **Occupation:** L
  - **Shelter:** B
  - **NL Assets:** H
  - **Food Security:** NS
  - **Cash flow:** NS
  - **Participation:** N
  - **Schooling:** N
  - **Social Status:** L

- **Migration (planned)**
  - **Occupation:** M, L
  - **Shelter:** B
  - **NL Assets:** M
  - **Food Security:** NS
  - **Cash flow:** NS
  - **Participation:** Y
  - **Schooling:** Y
  - **Social Status:** M

- **Migration (forced)**
  - **Occupation:** L
  - **Shelter:** B
  - **NL Assets:** L
  - **Food Security:** NS
  - **Cash flow:** NS
  - **Participation:** N
  - **Schooling:** N
  - **Social Status:** L
We used the capability approach framework to discern the decision-making strategy within a household (medium poor and poor) on migration (seasonal, temporary, forced or permanent). Seasonal migration (S) occurs when people face environmental and climatic disasters. They try to recover and adapt by borrowing money/taking loans as micro-credit and increasing income through alternative livelihood options. In such cases, income-earning members (particularly males) also migrate quickly following agricultural seasonality. It is important to note that there are differences in decision-making at the household level when contrasting their normal life and life after a disaster. It is hard to find a sustainable solution for disaster recovery for most poor and middle-income families due to their limited savings and poverty in general (Rahman et al., 2013). They also decide to opt for temporary migration (T) when they have short-term alternative livelihood solutions (for example, fishing, day labour) in the locality, and income-earning members migrate for a short period (usually less than six months) to known places, mostly in the nearby cities.

Based on the data from our focus group discussions, we outline the typical decision paths that lead households towards a particular type of migration: seasonal, temporal or permanent (Figure 5.6) when differentiated by entitlements and prone to various conversion factors. In the study areas, people try to maintain a normal life for their household by taking alternative livelihoods; for example, outside the main agricultural seasons, people try to find non-farm jobs (rickshaw van pulling) to obtain local income. If that is not possible, the main earner of a household migrates temporarily (T) to get work in the brick fields. In the case of temporary migration, a male family member would formerly travel to nearby cities (such as Satkhira and Khulna) to earn a cash income by any means so their families could survive. However, in the past 10 years (mainly after severe cyclone Sidr in 2007), a new trend of young women migrating temporarily to work at ready-made garment (RMG) factories has emerged.
Migration decision making process at the household-level in the study areas (southwest coastal region) in Bangladesh through participatory household level exercise

- Have occupation/job/work
  - Live on savings
  - Save assets, livestock
  - Low paid occupation (for mid and lower mid income groups, less often for low income)

2. SEASONAL MIGRATION

3. Loan / micro credit from NGOs/ Loan from people with certain interest rate for alternative livelihood options (e.g., petty trading, livestock farming etc.) for food security, income generation activities and to try to keep normal lifestyle such as continue education/schooling for children, supply food, clothing, other basic needs including health input for the household.

4. Is there extra economic burden due to loan?

5. More loan to start agriculture or alternative livelihoods/ start other business, rebuild house, medication, marriage of family members (daughter/son) etc.

6. Disasters

7. Are other livelihood options available locally to maintain normal life, pay loan etc.? 

8. TEMPORARY MIGRATION

9. Did they lose absolutely everything (house, assets, livestock, no possibility for loan)?

10. * Sell out belongings/ assets, try for more income (to repair extra loan or to smooth income), i.e., switch to a different activity within the local area

11. Did they find a good job?

12. MARGINALIZED; NO OPTION

Figure 5.6: Household-level migration decision making in the study areas
In the case of a sudden onset disaster, when households lose their homestead, house, assets and livestock and have nowhere to find living and income opportunities, they are forced to migrate permanently together with all family members. The forced migration is never planned; therefore, getting a good job in a new location is impossible. In this case, households forced to permanently migrate either find a job to live a normal life or become marginalized again in the new place.

Our focus group discussions showed that freedom of choice is a key element in the discourse on migration as a climate adaptation option. It is not only forced migration that is problematic. A forced option to stay is, perhaps, even worse. Suppose an individual does not migrate from an area under threat of environmental shocks and deprivation of resources. In that case, it may lead to a downward spiral when people are already poor and vulnerable to climate change, and households affected by disasters become even poorer. This category is called the ‘trapped population’ (IPCC 2014). This usually applies to poorer households whose livelihoods are adversely affected by the environmental change but do not have any resources to move (NCEA 2015).

5.6 Conclusion

Mass migration, either seasonal or temporal, of labour from the rural agriculture sector to urban non-agricultural sectors is a common strategy households use to diversify their livelihood options; and is increasing due to the impacts of climate change (Tacoli et al. 2015). This type of migration creates unemployment, homelessness and poverty in cities. Lack of city planning creates urban slums, and the industrial sector cannot absorb large numbers of migrants. Permanent migration was also recorded in study areas among wealthier families (rich and middle class) seeking better education, income and livelihood opportunities. The focus group discussions revealed that freedom of choice is intrinsically valuable to individuals, enabling the ability and opportunity to achieve their destiny both as a person and as part of various communities. Yet, migration is often a forced action rather than a free choice. Freedom of choice concerning migration and migration decisions have long-term multi-dimensional consequences for human lives and livelihoods. Migration is an adaptive response to changes in people's circumstances (Tacoli et al. 2015; Montreux and Barnett 2009; Tacoli 2007), and the effect of a single factor (e.g. climate variability) is not the only cause of a migration decision and other factors (e.g. socio-economic condition) are interlinked.

In the future, increasing the probability and severity of climate-related disasters is expected to cause more migration than currently observed. This paper studies migration in coastal regions in
Bangladesh through the conceptual lens of Sen’s capability approach and highlights the role of freedom of choice. Our focus group discussions engaging 215 respondents from 2013-2015 reveal several conversion factors (both push and pull) those influence migration decisions. The article outlines the differences among economic classes concerning various reasons driving a decision on whether an individual or household migrates or stays. Our study indicates that in addition to conversion factors, it is freedom of choice that is important to achieve certain functionings (being or doing) in Sen’s terminology. According to the capability approach framework, people choose functionings for a life they want, and freedom of choice in pursuit of well-being is central to this. In the context of migration in coastal Bangladesh, fuelled by increasing climate variability, freedom of choice is instrumental in drawing the line between migration as an adaptation option and forced migration. We synthesize the qualitative data from the focus group discussions to outline the typical decision paths leading to seasonal, temporal and permanent migration decisions. Our findings support the conceptual premises of Sen’s approach and can be used to plan better actions for mitigation and adaptation for the coastal communities of Bangladesh.

Some challenges were experienced during the fieldwork. The general problem is that although the study participants were informed about the study objectives, they still frequently hoped for benefits resulting from their participation and that these would come to them later. We informed them and stated clearly that this was not the case, but due to the difficult socio-economic condition of the people living in these areas with limited livelihood opportunities and the prevalence of aid programs from various NGOs, private, government and international organizations, some of the participants expected at least for some support.
5.7 References of Chapter 5


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CHAPTER-6: CLIMATE CHANGE MIGRATION AND THE FREEDOM OF LIVELIHOOD CHOICE

6.1. Abstract

Purpose - The lives and livelihoods of the people living in the coastal areas of Bangladesh are already impacted by climate change and environmental degradation. The people of the coastal areas mostly depend on the natural resources within and around their territory, and due to resource depletion and recurrent natural disasters, they are putting a lot of pressure on their lives and livelihoods. Rural-urban migrations and internal and external migrations occur for alternative income generations and to have income and livelihood opportunities. This paper analyzed the freedom of alternative livelihood choices of the migrants and the socioeconomic consequences.

Methodology - This paper is based on the study of the background of migration and the status of migrants in origin and destination points from coastal regions and the city areas (slums). The study uses mixed methods to identify the conversion factors (variables) that matter to the choice of the migrants’ incomes and livelihoods to run a life they choose and reason to value.

Findings – Migrants’ ability and freedom can positively change their lives by accessing social, economic, and political assets and opportunities, however, with a conceptual effort to apply Amartya Sen’s “capability approach” to the study of freedom of livelihood choice and migrants' well-being as a constituent part of climate migrants in Bangladesh.

Keywords Climate Change Migration, Freedom of Choice, Livelihoods, Coastal Areas, Rural-Urban, Bangladesh

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4 This chapter has been submitted to the International Journal of Climate Change Strategies and Management on 29 December 2022, Manuscript ID- IJCCSM-122022-0159 and currently under review
6.2. Introduction

Migration connected to the economic development of Bangladesh has been a general phenomenon for decades (Mannan, 2016; Masuduzzaman, 2014; M. Sarker et al., 2018). People have also been moving throughout Bangladesh to secure their livelihoods. The migration has gradually increased due to the rise of the population of Bangladesh and the noticeable movement observed since the 1960s (Etzold et al., 2014; Luetz, 2018) and the 1970s onward the rural to urban migration impelling for the sake of the alternative livelihoods of the rural poor (Afsar, 2005; Farhana et al., 2012; Haan et al., 2000; M. Z. Hossain, 2001). Migration is easier in the course of world development and globalization. Now, migration is not bounded by the internal territory but rather outside the country with south-south and south-north dimensions (Mannan, 2016; Masuduzzaman, 2014; M. Sarker et al., 2018). Internal migration within the country remains, as usual, other than disaster happens. A longitudinal study (1994-2000) in 14 districts of Bangladesh found that 59% of migrants move within their districts and 39% outside their districts of origin (Gray & Mueller, 2012).

Moreover, in long-distance moves of the migrants, 81% were to urban centres and 13% to international destinations and 6% to other rural districts. Rural-urban migration in Bangladesh is a dynamic and common phenomenon following several migration patterns based on its nature, like seasonal, temporary, and permanent (Farhana et al., 2012; M. Z. Hossain, 2001; Kartiki, 2011). There, forced and voluntary migration is happening based on individuals’ situations. All types of migration contribute to contemporary rapid urbanization. Livelihoods have become one of the major concerns for the climate-vulnerable people in Bangladesh. People with low incomes, women and marginalized section of the population are the victim of climate change (S. Ahmed & Eklund, 2021; E. Alam et al., 2018; Climate Change Cell, 2009; Hunter & David, 2009; Nishith & Rahman, 2016). The scenarios are, therefore, the changes in occupation and losing the current and ongoing occupation for bearing the livelihood expenses.

The capability approach (CA) framework is even fit to analyze and evaluate individuals’ freedom of livelihood choice and their livelihood well-being. In this study, the livelihoods of the people from the southwest coastal regions (as the origin) and Dhaka city (as one of the migration destinations) of Bangladesh. The shifting of livelihoods is generally seen in the poorer section of the community rather in the middle and rich families (Ayeb-Karlsson et al., 2016; Farhana et al., 2012). The climate and disaster-vulnerable people are the ones who hardly get access to income and resources, especially during hard times. Although there are uncertainties around climate
migration, one of the most asked questions is why people migrate to some already vulnerable cities (for example, Dhaka, the capital of Bangladesh and one of the most populated cities in the country) and face the (after-)migration consequences. This particular study reveals some of the important issues the migrant people face in their migration destinations. The migrated people settled in the urban areas of Bangladesh nearby or far away from their place of origin and sometimes outside the country (the southwest coastal people often migrated to India for income).

People who migrated to Dhaka have faced several social, economic, health, and environmental consequences by living in the slums and relatively low-cost areas. Hence, the study deals with migrants’ origin, social and economic conditions, livelihood options, movement and dynamics, and social participation and security, considering their livelihood well-being. This paper also examines the complexity of climate change impacts on human migration in the southwest coastal zone of Bangladesh to find migration as an adaptation to reduce climate change and disaster risk and vulnerability to have a life people want to live. Climate change may not be considered the major driving force for migration, but in recent years, due to climate change stresses, it has become predominant in displacement and migration aspects (Bernzen et al., 2019; B. Hossain et al., 2022; M. R. Islam & Hasan, 2016; Mallick & Siddiqui, 2015). Climate change has diversified impacts on the lives and livelihoods of the people from economic, social, and environmental aspects, which directly or indirectly play an important role in the migration decisions of individuals (S. Ahmed & Eklund, 2021; M. R. Islam & Shamsuddoha, 2017).

This study is being analyzed through Amartya Sen’s capability approach. The concept of capability is described together with the capability and the functioning. According to Sen (Assaduzzaman et al., 2020; Eichsteller, 2021; Nambar, 2013; Robeyns, 2003a, 2005), functionings are the set of things according to individual choices that an individual may value being or doing for her/his life s/he wants to live. In the capability approach, human well-being should be assessed in light of the individual’s social, economic and political environment as well as two elements; functionings and capabilities (Mizohata, 2011). Sen does not advocate a particular concept of the good life but emphasizes the importance of freedoms that each exercise concerning the options that matter most to her or him (Archard & Sen, 1995; Amartya Sen, 2001a; Amartya Sen & Others, 1987). Thus, human development is seen as expanding the range of genuine freedoms and choices for each individual (Bavetta et al., 2014; Amartya Sen, 2001a). For that, they need access to basic resources, including food, education, mobility, and other things, which are important to an individual’s idea of a good life. The resources include natural, social, economic and political assets and their inclusion with social and institutional structures. Therefore, the capability of an individual connects to the broader aspects of human development,
which depends on genuine freedoms to achieve his/her chosen aims. According to Sen (Amartya Sen, 1984), freedoms lead directly to valuing people’s capabilities and instrumentally to valuing things that enhance these capabilities. The notion of capabilities relates closely to the functioning of a person (Robeyns, 2003a, 2005). In the recent decade, inequality has also grown due to climate change (Burzyński et al., 2019; Pörtner et al., 2022). Migrated individuals have double difficulties; they usually migrate for their income and livelihoods for their families and have new locations with different circumstances (e.g., finding livelihood opportunities within new situations/ cultural settings). They are mostly low-income people with fewer skills and education. The study also tries to find the challenges of the capability approach to applying empirically apply or operationalize the concept of capabilities, furthermore, to measure an individual’s achieved functionings such as income by several variables (as well as conversion factors) such as age, gender, health, occupation, education, etc. We estimate the relationship between functionings (resources/income) and the personal conversion factors. However, income cannot be a good substitute for measuring human well-being in a wider context.

In the capability approach, we found that the conversion factors play a vital role in converting the commodities into functioning (beings and doings). The conversion factors depend on personal, socio-economic and environmental factors. This study emphasized the personal conversion, environmental and social conversion factors for the migrants and non-migrants. This paper seeks to reveal the impacts of migrants' and some cases of non-migrants personal conversion factors (age, sex, health, education, income etc.) on livelihood option choice and considering their environmental and social conversion factors. In the capability approach, well-being freedom can be measured by individual capability, that is, the achievable functionings of an individual. The level of the achieved functionings is interpreted as their freedom of choice with relevant variables. Although Amartya Sen’s capability approach is theoretically attractive (Kuklys, 2005a), it isn't easy to operationalize empirically. One reason is that there is no specific information on how we can measure the functioning and the concept of capabilities to operationalize. Therefore, the article focuses on the main goal, i.e., is it better to migrate in the face of climate change? We also try to find two other sub-questions:

1. Migrants vs non-migrants population in groups
   a) Are people with particular livelihood strategies more likely to migrate than others?

2. Migration population and their situation before and after migration
   a) Do the migrated population meet their basic needs for livelihoods and well-being, or are they deprived of them?
6.3 Methodology

This study follows participatory research approaches in the field. The interactive process leads the study effectively to collect certain information directly from their family members at the place of origin or relatives and the migrants themselves. The study also follows the desk and extensive fieldwork following qualitative research methods considering livelihoods, climate change, migration, and freedom of choice of the individuals (migrants) from the southwest coastal Upazilas (sub-districts) as the place of origin of the migrated population and migrated people from one of the city slums from Dhaka city (one of the most important destinations for migrants). The study is based on observation, interviews, and focus group discussions of 921 non-migrants (from all four upazila) and 114 migrants (64 from coastal sub-districts and 50 from Dhaka). We find the snowball method very effective in selecting the migrant people, households and their known people to collect detailed information about the migrants. A qualitative participatory scaling (ranking/ rating scale) process was also undertaken involving the non-migrants and migrants to explore their experience and understanding regarding their well-being (livelihoods, etc.) at their place of origin and migration destination.

6.3.1 Case study area

The study areas are located in the southwest coastal regions of Bangladesh. All the households from the villages of Shyamnagar, Dacope, Mongla and Rampal Upazila (sub-districts) of Satkhira, Khulna and Bagerhat districts and one slum area (Begunbari slum) in Tejgaon, of Dhaka city. The households in the villages included men and women from the ethnic minority (Munda) and non-ethnic communities. Interviews and FGDs were conducted with the migrant individuals and families in the Begunbari slum in Dhaka city to have comparative information about non-migrants and migrants and migrants before and after the migration situation. Within the slum area, the poor and informal settlements were identified, which were then visited. Moreover, we asked local habitats, such as tea stall owners or rickshaw pullers, where new settlements were seen in the city. In addition to these locations, we have observed and visited a few other areas (communities) close to the city study areas and villages. We find the villages in the coastal areas face more natural disasters (for instance, cyclones & flooding) than the city areas. In the cyclone-affected region, the intention of the talk to the families was whether or not family members had migrated and how the remaining families had adapted to frequent disasters. Several people had died or were missing in the village where river erosion had occurred, as the river had carried away the land with households at night. It is noted that (observation) people never expect to live outside their village, although they have lived with poverty and vulnerability in their current locations since
Figure 6.1: Map showing study areas in the sub-districts of origin (green) and the sub-districts destinations (red) of the migration flow (Source: Author, 2016)

6.3.2 Data collection

Data were collected using qualitative and quantitative techniques in coastal areas and the slum areas of Dhaka city (capital). Interview questions were based on Amartya Sen’s capability framework (Robeyns, 2003), focusing on personal, socio-economic and environmental factors that impact...
individual functioning. Individual functioning was analyzed by assessing individual capability relative to conversion factors. We interviewed 921 respondents, who are non-migrants from different villages from four Upazilas (green in figure 1), and we interviewed 64 migrants' individuals/ family information from Shyamnagar Upazila and 50 migrants’ individuals and households from Begunbari slum of Dhaka city (red area in figure 1). The two locations were chosen considering the origin of migrants and one of the many migrants’ destinations within the country. To find migrant individuals and families, we used the snowball approach. The snowball approach made the task to find the migrants’ and their families (& relatives) for information collection. We interviewed the chairmans and members of the Burigoialini and Munshigonj union council, among other local leaders and change agents, during our data collection for further information. The main information of the migrants included the reason for migration, age, gender, before and after migration occupation, no. of household members, social network and income, location information (origin of migration and migration destination) and basic needs considering the well-being. We collected migrant information (64 respondents’ indirect information before and after migration) at the place of origin where their families and or relatives live. The direct observation of the situations also helped to have further insights (for example, power relations and local dynamics) into the lives and livelihoods of the migrants. Most of the respondents in the village community were female (89%); on the other hand, most of the respondents (91%) were male in the slum areas. During the day, most of them went out to work, and females remained at home for household chores in the villages. We found more male respondents in the city (slum) area, where most of the respondents were rickshaw/ rickshaw-van pullers, pretty traders and labourers, and other roadside people (50 respondents’ direct information). We found that the women in the city (slum) work in the formal sectors (e.g., readymade garments) compared to women living in the village. The data were collected between 2013-2015. Afterwards, we cleaned the data by checking the reputations, validated it through group discussions, and collated it for data analysis. This is to note that the fieldwork is based on Amartya Sen’s capability framework, which focuses on the personal, socio-economic, and environmental factors that impact individual functioning (being and doing). The individuals’ functionings can be analyzed by assessing individual capability set in consideration with the conversion factors. Here is some basic information about the migrants and non-migrant populations from the collected data set.

There are a few common migration destinations for the migrants, which are grounded on their information (on job availability, income possibility), network (known and secure), and characteristics of migration (seasonal, temporary, and permanent). Our data collection found that people from Shyamnagar migrate to different locations within and outside the country (Figure 2).
Table 6.1: Basic descriptive statistics on non-migrants and migrants’ population samples.

<table>
<thead>
<tr>
<th></th>
<th>Non-migrants</th>
<th>Migrants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>N=921</td>
<td>N=114</td>
</tr>
<tr>
<td>Migration</td>
<td>15% (seasonal</td>
<td>100% (temporary &amp; permanent)</td>
</tr>
<tr>
<td></td>
<td>migration)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Mean (37.6); SD</td>
<td>Mean (40); SD</td>
</tr>
<tr>
<td></td>
<td>(11.5)</td>
<td>(9.6)</td>
</tr>
<tr>
<td>Income</td>
<td>Multiple income</td>
<td>Mostly single-income sources</td>
</tr>
<tr>
<td></td>
<td>sources</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean (5893); SD</td>
<td>Mean (8443); SD</td>
</tr>
<tr>
<td></td>
<td>(3949)</td>
<td>(3726)</td>
</tr>
<tr>
<td>Gender (ratio)</td>
<td>85% female</td>
<td>Male 90%</td>
</tr>
</tbody>
</table>

16% female and 84% male migration were observed in the migration data (n=114).

In the case of seasonal and temporary migration, most of the male members (income-earning members) migrate to several destinations as per information on job availability and income potential. Migration destinations from Shyamnagar are shown in Figure 6.2. Most of the income-earning males usually migrate for seasonal and temporary work.

![Migration Pathways](image)

Figure 6.2: Migration pathways of the family members from non-permanently migrated households (from the place of origin to various migration destinations) Source: Author, 2016
6.4 Results and Discussion

To understand to what extent migration improves the well-being of migrants, we present our results structured to answer the two research questions. Firstly, to assess how the well-being of permanent migrants compares to non-migrants well-being, we compare the population of 921 households that decided to remain in the place of origin with a population of 114 migrants who did move. In addition to earned income, we compare the two groups on other aspects that contribute to well-being. The latter include assets at a household’s disposal, water and food security, human capital accounting for health and human rights, diversity of income sources, housing conditions and social capital. Secondly, we focus on the population of migrants. In particular, we compare the aspects of the well-being of the migrant population (114 respondents) before and after their decision to migrate to reveal how the migration decision affected the well-being of the migrant group.

6.4.1 Well-being of migrants versus non-migrants

6.4.1.1 Occupational changes of non-migrants and migrants

According to individual and household strategies, the choice of occupation and the occupation changes are diversified among the migrants and non-migrants (Bandyopadhyay & Skoufias, 2015; Wilson, 1985). It is noted that Bangladesh is one of the world's largest readymade garments exporting countries, and most of the garments industries are in the city (and suburbs) areas. We found that the migrant population work in these garment industries. There are no garment industries in the coastal areas; therefore, we didn’t find garments job for the non-migrants, and farming is also absent in the migrant population, while some of the non-migrants have small and medium-scale farming (figure 4). The lives and livelihoods of the coastal population are at risk of frequent natural disasters, destructive human activities, and global climate change's impact (Gray & Mueller, 2012; M. R. Islam & Hasan, 2016). Seasonal and temporary migrants change their livelihood strategies according to the availability of work in the migration destination and try to raise their income level to maintain their lives.
Figure 6.3: Occupational changes before (non-migrants) and after the migration (migrants)

Figure 6.4: Non-migrant and migrant’s monthly income differences (in Bangladeshi Taka)

### 6.4.1.2 Income of Migrants and Non-migrants

Non-migrants' and migrants' incomes depend on their livelihood options (occupational practices, skills, and job availability in places). Local subsistence farmers are under livelihood stress because of several natural hazards (cyclones and floods) and crop failure for the salinization of soils due to climatic variations and changes. To diversify income, some families send out one family member (temporarily) to work in the city and send back the income to their family in the village. However, this does not always work as expected and depends on suitable job availability and skills. People migrate to skip their poverty and vulnerability and have better opportunities to
feed their families and have a better future. Some can send their income to their family; some cannot; eventually, we find that the average income level of the migrant population is higher than the non-migrants income level (figure 6.5). This gives the impression that they have higher job availability when they migrate than in their place of origin. Seasonal migration happens following the cropping season or the areas. When they have a lean farming period, they migrate to other areas to find farming jobs (as farm labour).

6.4.1.3 Age of the non-migrants and migrants

Age is one of the most influencing aspects for non-migrant and migrants that affect their migration strategies. From the comparative analysis of the age of non-migrants and migrants, the rate of migrants is comparatively much higher at 29-44, whereas migration movement decline after a certain age (figure 6.6). This is to note that life expectancy in Bangladesh is now 70.7 years (BBS, 2015), and migration was found to be higher in the middle ages according to people’s life expectancy in Bangladesh. This can differ when people have a prompt disaster (cyclone Sidr and Aila) and no other option than to escape their homestead.

Figure 6.5: Age of non-migrants and migrants

6.4.1.4 Achieved functionings of the non-migrants (921) and migrants (N=114)

The coastal areas of Bangladesh are prone to several climatic hazards (salinity intrusion, sea level changes) and natural disasters (S. Ahmed & Eklund, 2021; E. Alam et al., 2018; Climate Change Cell, 2009; Mallick & Siddiqui, 2015). People living in subsistence agriculture cannot prepare well for natural disasters. Considering all the contemporary environmental issues and
economic pressure, they try to live in vulnerable places because of their known social network by generation (Boas, 2020; MacKenzie et al., 2019; Torres & Casey, 2017). But intense and frequent natural disasters force them to flee; rather, they voluntarily migrate for economic well-being. In addition to the factors of migration, we also see the individuals' functionings (being and doing) through the lens of individual well-being. Deprivation of access to services and opportunities is linked with restricting an individual's freedom of choice to live in a way that they reason to value (Assaduzzaman et al., 2020; Amartya Sen, 1984, 2001a) (Sen, 1992). An individual's freedom of choice enhances well-being (S. Alkire, 2007; Bavetta et al., 2014; Mario Biggeri & Karkara, 2014b).

The deprivation of access to services and opportunities is linked with individuals' freedom of choice to live a life they reason to value (well-being). The basic needs come first when we think about livelihood and well-being. For example, housing (shelter) and access to healthy water and sanitation are the two common sensitive issues for the migrants. They usually settle in immediately available low-cost areas with low-cost housing. People migrate for various reasons, namely poverty and natural hazards, to lift themselves out of poverty and vulnerability and, most importantly, to escape food insecurity in the village while living on subsistence agricultural practices and overall to have a better future. Though they foresee that they will have more access to resources and opportunities after migration into the cities, in our case, we found that cities are prepared enough to accommodate them. In other words, cities are no more safe-haven for them. There are not sufficient employment opportunities and access to social services and resources. Therefore, the migrants often end up in a poverty trap with less expected income and less personal skills. We also found that they had a strong social network built over generations. When they migrate to the cities, they are alienated by a fragmented social network. In the case of women and their families, such situations cause distress and insecurity for the living. At the same time, they have protection in the villages where they have lived for a generation. Despite all the circumstances, people choose to migrate, and thus the migration rate is very common. In the slum areas, we found that migrants with higher income have more access to food and health facilities better than before. In contrast, less-income people have problems with worse living conditions (water sanitation, health) and higher prices of food and shelter. Compared to the before and after migration, we tried to observe individuals' achieved functionings summarized in Table 6.2.
<table>
<thead>
<tr>
<th>Achieved functionings</th>
<th>Livelihoods and capabilities before migration (Non-migrant)</th>
<th>Livelihoods and capabilities (potential changes) after the migration (migrants')</th>
</tr>
</thead>
<tbody>
<tr>
<td>Livelihood assets</td>
<td>Household assets, mainly the livestock sold before migration to the city/ for having cash-capital</td>
<td>After migration, they don't have any livestock for their additional income and family nutrition.</td>
</tr>
<tr>
<td>Water stresses and scarcity</td>
<td>Access to drinking water (although salinity is a problem in the coastal areas, they have water sources.)</td>
<td>No one has water sources. They access water mainly from the government-owned pump house. No safe and reliable access to water.</td>
</tr>
<tr>
<td>Loss of property and residence</td>
<td>Households face severe disasters (cyclones, floods, river erosion) and the loss of their houses. Have their house in the origin of migration/ place of residence, where their family lives.</td>
<td>No one has their household land areas; rather, they settle near a footpath or rent a room/ sometimes, the room is shared with similar migrants.</td>
</tr>
<tr>
<td>Agriculture and food security</td>
<td>Have small or medium-scale agricultural practices (e.g. homestead gardening). They do sharecropping and can meet part of their household nutrition requirement from the production.</td>
<td>They have no such facilities in the migration location (cities)</td>
</tr>
<tr>
<td>Human capital (health, education, loss of lives)</td>
<td>Have health access for them and their family members (disruptive health access for the remote (isolated) community population</td>
<td>Due to livelihood constraints, they face more health crises than before because of insufficient food supply, and health and hygiene facilities are costly.</td>
</tr>
<tr>
<td>Shelter as primary needs</td>
<td>People have their shelter (households)</td>
<td>Have no shelter on their own, rented (expensive)</td>
</tr>
<tr>
<td>Gender disparity</td>
<td>Males work outside, and females do household chores</td>
<td>Both male and female works outside for a living (income)</td>
</tr>
<tr>
<td>Social network</td>
<td>Has own community by generations, strong social network and socially protected. Representation in local institutions with voting rights</td>
<td>Fragmented community, No local representation &amp; voting rights, and socially excluded</td>
</tr>
<tr>
<td>Employment availability</td>
<td>Multiple sources of income</td>
<td>Mostly single sources of income</td>
</tr>
</tbody>
</table>
6.4.1.5 Needs and deprivation of the non-migrants (N = 921) and migrants (N = 114)

Climate change and migration are complex and associated with several issues (Etzold et al., 2014; Hunter et al., 2015; Mallick & Siddiqui, 2015; M. Sarker et al., 2018). One factor cannot provide sufficient information about climate change, migration and its consequences. Individuals' decision-making for the migration depends on several inter-dependent causes and issues, including economic factors and social networks in their past (before) and present locations (after migration). The results reveal that income inequality strongly affects non-migrant and migrant social networks and social inclusion (Curran & Saguy, 2001; Hunter et al., 2015; Jha et al., 2018; MacKenzie et al., 2019; Mannan, 2016; Torres & Casey, 2017). Although climate change impacts people's lives and livelihoods (occupations) and people have economic deprivation, we cannot completely separate from one another. Therefore, combining those leading to migration decision-making and people's migratory movement is better. The study also reveals that income inequality always has big differences between non-migrants' and migrants' social networks and social inclusion. Even less fortunate people in society has social network from their generation. But when they migrate, their social network becomes fragile, and in the location of migration or migration destination (cities), they feel less connected with society (feel excluded). In these cases, women feel more insecure than male members of society (S. Ahmed & Eklund, 2021; Curran & Saguy, 2001; Torres & Casey, 2017).

Furthermore, we analyzed how the functioning measurement can differ with constant change. Though people migrate to achieve the available functionings for their livelihood and well-being, they also deprive of their basic needs compared to their previous (before migration) location. We, therefore, scale their needs and if they can fulfil them or deprive them by numbers 1-10, where 1 is the lowest and 10 is the highest access to resources and services available in their situation. We selected health, shelter, education, water sanitation, social network and their rights. We compared the locations (origin and destination of migrants and non-migrants); the result is presented in Table 6.3.
Table 6.3: Non-migrants (921) and migrants (114) access to needs and deprivation (scale 1-10)

<table>
<thead>
<tr>
<th>Needs</th>
<th>Non-migrants (SD)</th>
<th>Migrants (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>6 (.7)</td>
<td>3 (.7)</td>
</tr>
<tr>
<td>Shelter</td>
<td>9 (.6)</td>
<td>0.5 (.5)</td>
</tr>
<tr>
<td>Education</td>
<td>7 (1)</td>
<td>2 (.7)</td>
</tr>
<tr>
<td>Water sanitation</td>
<td>9 (.7)</td>
<td>0.5 (.5)</td>
</tr>
<tr>
<td>Social Network</td>
<td>9(.9)</td>
<td>2 (.9)</td>
</tr>
<tr>
<td>Rights</td>
<td>8 (2)</td>
<td>1 (.6)</td>
</tr>
</tbody>
</table>

Figure 6.6: Non-migrants and migrants’ access to needs and deprivation (those six needs)

6.4.2 Well-being of migrants before and After the migration decision

6.4.2.1 Occupational Changes (livelihood switching) of Migrants

The livelihoods of the coastal regions of Bangladesh are closely linked with the available coastal natural resources, mainly fishing and non-timber forest resources (E. Alam et al., 2018; Chen & Mueller, 2018; M. R. Islam & Hasan, 2016; Mohammad Mahmudul Islam & Herbeck, 2013; Toufique & Yunus, 2013). The southwest coastal region of Bangladesh is also similar to the nature of other
coastal area’s livelihoods (Ahmad, 2019; I. Ahmed et al., 2019; Clarke et al., 2015; M. A. R. Hossain et al., 2018; Md Monirul Islam et al., 2014; Shameem et al., 2015; Toufique & Yunus, 2013). However, due to climate change and other environmental degradation, natural resources are depleting and impacting people’s lives and livelihoods in the coastal areas. Unsustainable resource extractions (fisheries and other natural resources, forestry) and human activities are intensifying the resource shortage (M. A. R. Hossain et al., 2018; Md Monirul Islam et al., 2014). The individuals, households and communities that depend on these resources face diverse socio-economic difficulties. However, the reasons for migration vary among individuals and places. Many people do not change their location of origin, while some already have seasonal, temporary or permanent migration. In the study, we find social (population growth, urbanization, and human security), economic (low income/poverty), political (conflicts) and environmental factors (natural disasters, environmental degradation/climate variability) that impact people’s migration movement. The migration movement varies mainly with people’s overall livelihood strategies (income and occupation) and according to their decisions and choices. The data show that low-income and poor people and people with temporary/seasonal occupations (daily labour, fishermen) migrate more than others (figure 6.7).

![Pie chart showing migration according to livelihood strategies](image)

**Figure 6.7: Migration according to Livelihood Strategies (source: survey data)**

Bangladesh is one of the most vulnerable countries to natural disasters. The frequency and intensity of natural disasters are increasing due to climate change and are expected to affect the country in many ways (Bandyopadhyay and Skoufias, 2015; (A. Islam et al., 2013a)). The southwest coastal areas of Bangladesh are prone to several natural disasters, namely,
cyclones, storm surges and flooding. Our field survey reveals that natural disasters impact longer-term or permanent migration when the affected areas have a crop failure, damage and destruction of households and belongings. In the study, we found several occupational patterns of the migrants before migration and the changes in occupation after migration. The occupational changes of the migrants depend on their age, sex, education, network (communication) and the city to which they migrate. Some skilled professional migrants usually look for similar occupations; for example, some skilled professional migrants (e.g. carpenters and cobblers) continue with that trade.

In contrast, people without particular skills search for available income-earning options, and their skills cannot be used, so they switch occupations. For example, in the study area, which is coastal, almost half of the people are fishermen (45%). When they migrate to cities, a commonly available job is rickshaw pulling, which they usually do with other occupations. Some of the examples of switching occupations are shown in Table 6.4.

Table 6.4: Some individual examples of occupational changes among migrants driven out of their place of origin by natural disasters 114.

<table>
<thead>
<tr>
<th>Type of displacement (internal/ within the country; external/ outside the country)</th>
<th>Drivers of root causes</th>
<th>Occupation before migration</th>
<th>Occupation after migration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>Cyclone Sidr 2007</td>
<td>Fisherman</td>
<td>Carpenter</td>
</tr>
<tr>
<td>Internal</td>
<td>Cyclone Aila 2009</td>
<td>Rickshaw van puller</td>
<td>Garments worker</td>
</tr>
<tr>
<td>Internal</td>
<td>Cyclone Sidr 2007</td>
<td>Boatman</td>
<td>Restaurant worker</td>
</tr>
<tr>
<td>External</td>
<td>Cyclone Aila 2009</td>
<td>Fishing</td>
<td>Carpenter</td>
</tr>
<tr>
<td>External</td>
<td>Cyclone Sidr 2007</td>
<td>Tailoring (sewing)</td>
<td>Tailoring assistant</td>
</tr>
<tr>
<td>External</td>
<td>Cyclone Sidr 2007</td>
<td>Rice-mill worker</td>
<td>Working in a factory</td>
</tr>
<tr>
<td>Internal</td>
<td>Cyclone Aila 2009</td>
<td>Fishing</td>
<td>Rickshaw van puller</td>
</tr>
</tbody>
</table>

In the coastal areas (study area), almost half of the people are fishermen (45%), and when they migrate to the cities, one of the most common and available jobs they do is rickshaw puller. This is an easy-to-get job they usually do along with other occupations. Again, this depends on their ability in terms of their age, education, networking and information etc. Some skilled professional migrants (e.g., carpenters and cobblers) usually look for similar occupations; however, people with no particular skills search for income-earning options anonymously. There are varieties of available occupations they choose. Here are some examples of non-migrants switching occupations when they migrate (figure 3).
Due to frequent floods and salinization of soils, potential crop failure is putting more and more stress on local subsistence farmers (E. Alam et al., 2018; Etzold et al., 2014; B. Hossain et al., 2022; Luetz, 2018; Mottaleb et al., 2013). To diversify income, some families “send out” one family member to work in the city and send back remittances to the village. This concept does not always deliver the anticipated results. All participants were asked whether or not they send money to relatives in the rural areas. The results were mixed. Some could support their families in the villages, some were not, sometimes there was no need in the village, and in some cases, the urban migrants received money and support from the villages. Therefore, it can be concluded that the assumption of prosperity from a life in the city and consequential remittances to the village is not always happening as expected. One more thing to note is that, though the migrant population have a higher income than in the past, they feel less comfortable in their destination because of social integration and security.
Figure 6.9: Migrants’ income before and after the migration (in Bangladeshi Taka)

6.4.2.2 Changes in the migrants’ well-being: are their basic needs met or deprived?

The consequences of migration are both beneficial and detrimental, and also different in terms of sending (origin) and receiving communities (destination) (Afsar, 2003; Bernzen et al., 2019; Haan et al., 2000; M. Z. Hossain, 2001; Kartiki, 2011). In the climate change migration phenomenon, the male member of the family migrates to other areas for better and alternative income generation for their well-being. The whole family migration mostly happens during a sudden on-set disaster and in the case of a planned migration. As long as security and cost are involved, most migrants leave their families there, and when they find a little better opportunity, they only bring their families. We find that female migrants have security and health, and hygiene problems (Evertsen & van der Geest, 2020; Luetz, 2018). They suffer more than their male counterpart in the family. Therefore, we see here that their income age limit is less than the male member of the family.

On the other hand, the male member generally bears all the family expenses; therefore, they go for earnings. They always look for new alternative livelihoods for their better earning until they are working age. If they have better income, they provide better shelter, health and education opportunities for their family members. But, it depends on their income, skills to have an expected job, higher income, and job market. The living cost is also comparatively much higher in the city areas, where the migrant populations have their destination. They cannot afford better living conditions and live in the streets and slums.

Consequently, they cannot achieve their due functionings, eventually, higher income than before. They find a place to live but cannot be socially included; they remain excluded from mainstream society. Considering the circumstances and after observation, we selected the Likert scale to see if
their needs are met or still deprived, and we present the mean of their responses in the table below (Table 6.5).

**Table 6.5:** Migrants (114) access to needs and deprivation (scale 1-10)

<table>
<thead>
<tr>
<th>Needs</th>
<th>Before (SD)</th>
<th>After (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>6 (.6)</td>
<td>3 (.7)</td>
</tr>
<tr>
<td>Shelter</td>
<td>8 (.7)</td>
<td>0.5 (.5)</td>
</tr>
<tr>
<td>Education</td>
<td>6 (1)</td>
<td>2 (.7)</td>
</tr>
<tr>
<td>Water Sanitation</td>
<td>9 (.6)</td>
<td>0.5 (.5)</td>
</tr>
<tr>
<td>Social Network</td>
<td>9 (1)</td>
<td>2 (.9)</td>
</tr>
<tr>
<td>Rights</td>
<td>7 (.8)</td>
<td>1 (.6)</td>
</tr>
</tbody>
</table>

Compared to their (migrant population) past and present income, relevant needs (most basic) and access to opportunities and services, they are economically better off. Yet, they do not feel at home after the migration because they are deprived and often trapped in the situation that they live in.

**Figure 6.10:** Migrant’s access to needs (basic)
Conclusions

As climate change accelerates, more than 35 million people in Bangladesh will be at risk of sea level changes, more than doubled since 2008 (Intergovernmental Panel on Climate Change & Groupe d'experts intergouvernemental sur l'évolution du climat. Working Group II., 2007; A. Islam et al., 2013b; Saroar et al., 2015; Zhongming et al., 2012)(GoB, 2005; Canziani., et al. 2007; IPCC, 2014; Saroar et al. 2015; World Bank, 2012), leading to migratory movement of the coastal population. This study discussed the migration pattern, livelihood options, and individual capabilities and functionings. According to our hypothesis for the study, the capability doesn’t increase with income level and thus, people fail to convert their income into functioning. We measure the functions together with the income and other relative variables, like age, social networks, and access to resources and services for personal conversion factors of the individuals. In the study, we find that variables are interconnected and cannot be measured individually but in consideration of other conversion factors such as socio-economic and environmental factors. We also note that only one or two personal conversation factors (income, age, and occupation) do not significantly affect expected functioning (being and doing) regarding expected livelihood well-being. It looks like it gets worse for migrants, but they always want to return after they earn in case (non-migrants). Ultimately, we conclude that Sen’s capability approach can be used to assess migrants’ well-being by a more comprehensive assessment of all (personal, environmental and social) conversion factors.

6.5.1 Limitations of the Study

This study has some limitations. Although participants had been informed about the intent and limited scope of the study, it was still frequently hoped that participation benefits would come to them later. We clearly stated that this was not the case due to the generally very difficult socio-economic situation and the prevalence of social safety-net programs by the government of Bangladesh and assistance from various international organizations. We assumed that some participants were at least hoping for support—another difficulty faced in random interviewing in the slum areas. After entering the slum areas, people wanted to hear what questions were asked and what the newcomers were doing. People were curious about the information. This can lead to bias in the participants’ answers, as they are not anonymous to their immediate surroundings. Information may be excluded or altered because of individual reasons. Because of interviewing several families within one area, the information provided was cross-checked as much as possible, thus minimizing the risk of an omitted variable bias.

The comparatively small sample of migrants in the slum areas is also a limitation for quantitative data analysis. While interviewing in the slum areas, people other than the respondents also showed interest and curiosity to be interviewed. This can interrupt the interaction between the
interviewer and the respondents as much as possible; efforts were made to cross-check and avoid discrepancies, as the information was collected from (almost) homogenous areas.

6.5.2 Acknowledgements

The authors gratefully acknowledge the participants of all the study areas for their time and the insights and information they provided.
6.6 References of Chapter 6


Bernzen, A., Jenkins, J. C., & Braun, B. (2019). Climate Change-Induced Migration in Coastal Bangladesh? A Critical Assessment of Migration Drivers in Rural Households under


CHAPTER-7: CONCLUSION AND RECOMMENDATIONS

7.1 Summary of the Thesis

This chapter summarises the major findings, conclusion and recommendations of the PhD research in Bangladesh, one of the most vulnerable countries in the world to climate change impacts. These impacts will disproportionately affect the world's poor and vulnerable populations with a minimum contribution to the rising greenhouse gas emissions. Climate Watch (Watch 2020) shows Bangladesh's per capita emissions (tCO2e/person) are 1.46, and yet one of the climate change-vulnerable countries (Black et al., 2013; Intergovernmental Panel on Climate Change, 2014, 2022; Neil Adger et al., 2006; Younus, 2014). Recent global scientific assessments have stated with high levels of certainty that climate change is occurring, partly driven by anthropogenic interference with the climate system and that some impacts are unavoidable over coming decades (Assaduzzaman et al., 2023; Intergovernmental Panel on Climate Change, 2014, 2022; Martin-Ortega, 2023; Pfannstiel, 2023; Ranjan et al., 2023; Zhongming et al., 2012). Poor and marginalized farming communities, ethnic people and women are the most affected victims of climatic hazards in the study areas. Women have always played a vital role at the family level, but their role is mostly undervalued. In addition, migration is often considered an option to diversify income opportunities and escape climate change's impacts. This thesis explores the reasons behind different types of migration and the categories of people likely to undertake it.

The thesis investigates various issues and is framed from a conceptual perspective using Sen's capability approach. The research conducted for the thesis is aimed to shed light on how an individual’s expressed capability can help them adapt to climate change. The role of opportunities and individual freedoms in human well-being is central to this thesis. This research explores how individual capabilities (Sen) relate to poor people's ability to switch livelihoods in response to ecological and climate variability. In the thesis, ‘securing human freedoms’ is the expansion of opportunities for better functioning (being and doing) for individuals to lead the life they value (for their well-being). Following the aim of the research, the objectives are formulated as: ‘to investigate individual capabilities (freedom of choices) and to contribute to the ongoing human development knowledge related to risk, vulnerability and climate change adaptation at local and regional level’.

This thesis also tells us about the relationship between conversion factors/ determinants in a given context to achieve human well-being, considering the impact of climate change impacts. Especially, adaptation options and the underlying conditions are different for men and women and ethnic minorities in different adaptation practices and priorities. In addition, the capability approach provides some insights into these matters and provides a conceptual framework for thinking about
development issues. For example, to achieve more effective implementation of adaptation to climate change initiatives.

This research also explored the importance of the freedom of choice to achieve valuable functioning and adapt to abrupt climate change. An important aspect of freedom of choice is participating in the decision-making process at the family and community level, which is evident through participation. Although this thesis is not the final word in this research area (application of capability approach in the adaptation to climate change), it will help clarify some of the key issues in Bangladesh's climate change areas. Given the situation in Bangladesh, it can be replicated elsewhere (in other countries). This also includes some interesting uses for these ideas to consider for the adaptation to climate change and risk reduction strategies.

The main contributions of this thesis are thus adopting a capability approach framework to the climate change adaptation perspective considering the conversion factors as an important influence on capabilities.

### 7.2 Reflection of the Research Work

Climate change is factual based on scientific consensus, and people are already experiencing the impacts of climate change everywhere. However, Adaptation becomes a critical component to responding to the adverse impacts of climate change to protect lives, livelihoods, and ecosystems. The IPCC observes that climate change adaptation is the main goal of many countries, including Bangladesh. Bangladesh prioritizes and practices adaptation to climate change, although the stake is not enough. Bangladesh has repapered several adaptation policy and strategy documents, such as the National Adaptation Programme of Action (NAPA) and the National Adaptation Plan (NAP). Yet, actual adaptation to the adverse impacts of climate change at different levels within the country is not enough, and there are gaps as well. Furthermore, people with limited capability and institutional support (access to resources and services) are more vulnerable to climate change impacts due to limited adaptive capacity. The capability approach as a normative framework can claim that people can convert resources and opportunities into valuable functionings considering the several conversion factors such as social, economic, environmental and cultural conditions they have.

This research analyzes the existing gaps and challenges in adaptation to climate change for different segments of the community and individuals to reduce vulnerability to climate change and to achieve well-being for life by applying the capability approach of Amartya Sen. Capability is very much connected with resources and welfare. In contrast, climate change aggravates the risk of depleting resources, the environment and the economy; therefore, inequality arises, and we know
inequality conflicts with human well-being. The main goal of the thesis is to explore how individual capabilities (in the sense of Sen) relate to poor people's ability to switch livelihoods in response to ecological and climate variability. Following the aim of the research, the objectives are formulated as: 'to investigate individual capabilities (freedom of choices) and to contribute to the ongoing human development knowledge related to risk, vulnerability and climate change adaptation at local and regional level'.

The risk of climate change, it may be argued, will primarily fall on human beings who already face other existing or future environmental and economic stresses with insufficient coping mechanisms and limited adaptation capacities to cope with further loss and damage caused by climate change.

The thesis consists of two parts with seven chapters. The first part (Chapters 1-3) explained the rationale, theoretical underpinning and methodological perspectives of Amartya Sen’s capability approach. It looked at the implication of the capability approach in adaptation and reducing vulnerability to climate change for human well-being. While in the second part of the thesis (Chapters 4-6), which are the empirical research chapters, explains the possible applications of the capability approach to reduce the vulnerability and risk of climate change in the coastal areas of Bangladesh. This chapter summarizes the empirical chapters and presents recommendations for policy and further research possibilities. More specifically, the chapter discusses how the capability approach of Amartya Sen can be applied to different regions and contexts.

The thesis's empirical chapters are organized around contemporary climate change concerns and the responses in Bangladesh, especially in the coastal areas of Bangladesh, through the lens of the capability approach. The individual chapter of the thesis clarifies the climate change issues and adaptation options. The literature review and the empirical work addressed several research objectives to reach the goal. In particular, the thesis's second part has answered various research questions (chapters 4-6).

Chapter 1, the introduction, highlights the background of the thesis, gaps in knowledge and some of the subjects that will be pursued. We also discussed the significance of the research and its objectives. These include how individual capabilities relate to risk, vulnerability and climate change adaption at the local and regional levels. The outline of the thesis is also presented in the introductory chapter.

In Chapter 2, we explore the capability approach framework as a normative human development framework conceived by Amartya Sen and its potential for investigating how people can enhance their capability and functionings (being and doing, such as being well nourished and being educated) for their well-being. Amartya Sen's CA has generated enormous literature, and the chapter was concerned primarily with the capability approach in local and regional contexts and the choice and
application of CA. From the literature review and available theoretical frameworks of CA, this chapter also adopted an achievable framework for human well-being.

Chapter 3 reviews the methodological approaches to answer the research questions linked with the empirical research chapters. The chapter also addresses the characteristics of the study locations selected for data collection.

Chapter 4 assesses perceptions of climate change issues, freedom of choice and adaptation options of various social groups differentiated by gender and ethnicity among Bangladesh’s poorest southwest coastal communities. The chapter concentrated on women’s vulnerability, freedom and well-being at the family and community level to respond/adapt to climate change and live a life of dignity and integrity. The study shows significant differences based on gender and ethnic identity. Women from ethnic and non-ethnic communities are comparatively more vulnerable in the study areas of the southwest coastal sub-districts. The chapter provides research findings on women’s freedom of choice and climate change adaptation and how this interacts with participation at family and community level discourses for resilience to climate change impacts and human well-being. Additionally, the chapter investigates how social capital and cultural aspects interact with freedom of choice and the well-being of the poor and vulnerable women (ethnic and non-ethnic) in the coastal regions of Bangladesh.

The chapter focuses on answering two research questions.

RQ 1: How does freedom of choice differ based on gender and ethnicity?

The data shows that the local people in the study areas observe seasonal changes, changing rainfall patterns, and extreme weather conditions and notice changes in the frequency and intensity of natural disasters. As extreme weather conditions worsen, people in the study areas experience differentiated impacts based on gender and ethnicity. In general, men perceive the problems exacerbated by CC through the prism of more long-term and strategic horizons. In contrast, local women think differently about all issues in general, including CC, and they are more focused on daily family needs rather than strategic long-term solutions and decisions. Thus, women observe CC consequences only when they disrupt their daily lives within the family circle. At the same time, men compare the current situation to that in the past and foresee more long-term consequences and trends for the community at large.

RQ 2: How may these two (gender & ethnicity) interact with each other under the adverse consequences of climate change, and are particular social groups, which originally resided in similar geophysical conditions, trapped in an unfavourable environment?

The answer to the second question is that the vulnerability to climate change stresses may vary because of gender and ethnicity. Adaptive capacity is also an issue for these individuals since the
ability to adapt depends on wealth, social status and power, networking and wealth. Access to resources and, opportunities and freedom in decision-making in the context of CC adaptation at the family and community level require information and communication at all levels, which is limited for women (in both ethnic & non-ethnic people) in the coastal region of Bangladesh.

Chapter 5 focuses on the relationship between conversion factors and migration's freedom of choice. Again, it uses the lens of the capability approach and compares freedom of choice between an individual’s economic class. The chapter explores insights derived from the capability approach and its emphasis on individual freedoms and applies them to decisions for migration decisions. This paper seeks to address the following questions:

**RQ 3**: How do pull and push migration factors differ among various socio-economic groups? and

**RQ 4**: Where is the border between migration as an adaptation option and forced migration?

The research question **RQ 3** is answered by applying the capability approach framework, categorising the conversion factors into two main factors: push and pull migration factors. The balance between these two factors leads to an individual deciding to migrate or stay. These factors affect human migration, as, for example, studied by (Black et al., 2022, 2011). There is evidence of causal relationships between the factors and the migration decision to trail the pattern of migration (seasonal, temporary or permanent etc.). The factors influence and impact the decisions of the individuals, communities and societies who choose or are forced to migrate (Morton, A., P. Boncour and F. Laczko, 2008). These factors include personal characteristics (level of education, age, gender, physical health state), socio-economic characteristics of individual households (household head, size and financial ability etc.) or a community itself (availability of vital infrastructure such as schools, hospitals and other social institutions), and finally living and environmental conditions. Various push and pull factors may be behind a migration decision, which varies across different socio-economic groups. In most cases, a loss of livelihood and options to earn any income (non-climatic factors) are the main factors for the migration but environmental factors (climatic factors) act as a facilitator. The freedom of choice (ability & opportunity aspects) is intrinsically valuable to individuals and the ability to achieve their destiny as a person and as part of various communities. To answer the research question **RQ 4**, that mainly focused on the capability set and people’s freedom of choice described through freedom of choice and migration potential depending on the capability set. From this, people can realize their valuable activities, for example, whether or not to stay or migrate or forced to stay or migrate as per their capability set. For example, people can plan to stay when they have a better or medium occupation, suitable shelter with sustainable food security, cash flow, and high social status and participation. Similarly, people can plan to migrate when they have a medium or low occupational level, bad shelter (vulnerable to disaster) and non-sustainable food security with medium assets and social status.
According to their economic status, the rich and medium-class people have a good chance of having free choice of planned migration, or if they prefer, not to migrate and maintain a decent life. In contrast, some people are forced to migrate when they have a low occupation level, no land assets, low social status, no participation, non-sustainable food security, and vulnerable shelter. Instead of a free choice, these people (mostly from medium, poor and extremely poor) are forced to stay vulnerable and have no choice. Individual or household migration decisions are not only affected by a single factor but are influenced by multiple personal, socioeconomic and environmental factors (Black et al., 2011). Thus, environmental and climate change stress significantly influences displacement and migration-related decisions (Renaud et al., 2011). It is important to note the differences in household decision-making in normal life and after a disaster. It is hard for most poor and middle-income families to find a suitable disaster recovery solution.

The last empirical, Chapter 6, focuses on two research questions:

**RQ 5:** How does the well-being of permanent migrants compare to the well-being of non-migrants? To answer this question, we compare a sample of 921 households that decided to remain in their place of origin with 114 migrants who did move. In addition to earned income, the two population groups studied the aspects contributing to well-being. The latter include assets at a household’s disposal, such as water and food security, human capital supporting health and human rights, diversity of income sources, housing conditions and social capital.

**RQ 6:** How does the migration decision affect the well-being of the migrant group? To answer this question, we compare the multiple aspects of the well-being of a migrant sample (114 respondents) before and after their decision to migrate.

In line with the research questions, the results discuss the well-being of the migrants and non-migrants and the well-being of migrants before and after the migration decision. Firstly, to assess how the well-being of permanent migrants compares to non-migrants well-being, we compare the population of 921 households that decided to remain in the place of origin with a population of 114 migrants who did move. In addition to earned income, we compare the two groups on other aspects that contribute to well-being. The latter include assets at a household’s disposal, water and food security, human capital accounting for health and human rights, diversity of income sources, housing conditions and social capital. Secondly, we focus on the population of migrants. In particular, we compare the aspects of the well-being of the migrant population (114 respondents) before and after their decision to migrate to reveal how the migration decision affected the well-being of the migrant group.
7.3 Contribution of the Thesis in Adaptation to Climate Change in Bangladesh

The Capability Approach, developed by economist Amartya Sen and philosopher Martha Nussbaum, provides a valuable framework for addressing adaptation to climate change in Bangladesh. The Capability Approach emphasizes the importance of enhancing individuals' capabilities to lead lives they have reason to value. When applied to climate change adaptation, this framework focuses on enabling people to effectively respond to and cope with the impacts of climate change while maintaining their well-being and pursuing their goals.

In the context of Bangladesh, which is particularly vulnerable to climate change due to its low-lying geography and high population density, adaptation efforts should prioritize considering key principles aligned with the Capability Approach:

Climate change disproportionately affects the poorest and most marginalized communities. Thus, adaptation strategies must prioritize providing basic capabilities such as access to clean water, adequate food, healthcare, and education. These foundational capabilities provide a strong basis for individuals to withstand and recover from climate-related shocks.

Empowering individuals and communities is crucial to them with the knowledge, skills, and resources necessary to respond to climate change effectively. It includes supporting initiatives that promote climate-resilient agriculture, sustainable livelihoods, and community-based disaster management systems. Strengthening local institutions and involving communities in decision-making processes also enhances their agency.

Climate change adaptation should address social inequalities and promote social justice. Vulnerable groups, such as women, children, older people, and people with disabilities, are disproportionately affected by climate change. Adaptation efforts should incorporate gender-responsive and inclusive approaches, ensuring equal access to resources, opportunities, and decision-making processes. Recognizing different social groups' diverse needs, perspectives, and experiences is important. Access to accurate climate information and knowledge is critical for effective adaptation. Enhancing climate literacy among individuals and communities equips them with the necessary understanding to make informed decisions and take appropriate actions. Dissemination of climate information through various channels, including local languages and community-level platforms, ensures wider reach and understanding.

Climate change is a global challenge that needs additional attention from the global community. Bangladesh actively engages in global climate change negotiations and advocates for equitable and sustainable solutions. This research can help such global climate negotiations for access to climate...
finance, technology transfer, and capacity-building support from developed countries is crucial for effective adaptation measures.

By adopting the Capability Approach framework, Bangladesh can design and implement climate change adaptation strategies that prioritize human well-being, empowerment, social justice, and resilience. This approach ensures that individuals and communities have the capabilities to withstand, respond to, and thrive despite the challenges posed by climate change.

### 7.4 Policy Relevance and Recommendations

1. The findings reveal that layers of actors can prohibit even forced migration, leaving whole communities trapped in an unfavourable environment. This result has potential policy implications for disaster-prone countries like Bangladesh.

2. Using the perspective of Sen’s CA, the research finds that several conversion factors significantly affect an individual’s freedom to pursue valuable activities. There is scope to replicate the result for climate change adaptation at the local and regional levels, considering different contextual factors as conversion factors.

3. Social networks play a vital role in achieving livelihood well-being. Migrants miss their home (origin) after the migration because they are deprived of strong social networks in the migrated location and thus feel excluded from mainstream society. Mainstreaming social participation and social inclusion can contribute to human well-being.

4. We know climate change does not affect all human societies equally. From the research, it is revealed that access to services and opportunities also matters. So these are areas that government can intervene to ensure support and services to reduce people’s vulnerability. Restricted and unequal access also increases people’s vulnerability.

5. The literature review demonstrates that the CA is a normative framework and can be explored using several perspectives related to human well-being. For example, this research explored CA in the context of ‘practical implications’ following its fundamental concepts.

6. In the CA, development is seen as capability expansion and poverty as capability deprivation. For adaptation to climate change and sustainable development at the local and regional level, CA can be used at the policy level and in implementation by the researcher, policy maker and government and non-government organizations.

7. Lastly, the capability approach is a valuable framework for the researcher, policymaker and practitioners to explore further implications concerning the uncertainty of climate change and its impacts on human well-being in different contexts.
Hopefully, the thesis will be a springboard for future research and policy initiatives in Bangladesh, and the relevant issue is of significant importance considering similar situational aspects; it can be replicated in other countries as well.

7.5 Research Limitations

Like any research endeavour, I have faced the following limitations during my PhD research;

1. Availability and access to data and information: Availability and access to data and information is a challenge in Bangladesh. Some relevant data and information accessed were not user-friendly (hard copies and poorly maintained).

2. Time and resource constraints: The research fieldwork has also been conducted during the summer and monsoon seasons. Travelling in the monsoon to the coastal areas is a real challenge for outsiders unfamiliar with muddy and slippery village roads. I had to walk, and thus the time allocated for the interviews sometimes lapsed.

3. Financial Constraints: The PhD budget was limited and, therefore, had to minimize the field expenses. The respondents were from the low-income section of the community. Sometimes, I felt expectations of little subsidies from the respondents, which was hard to manage. Often the neighbour of the respondents asked to include him/her in the research, from their assumption that they will gain financial benefit if they are interviewed. However, the respondents were informed of the academic research objectives and the research purpose to avoid any unusual circumstances.

4. Ethical considerations of the research work were strictly maintained. Therefore, the data was collected only from the respondents available in the household (and who provided time voluntarily) rather than from someone at work. In this research, we have more female participants than males, who are at work during the day. This is the reason behind the greater number of female respondents than males.

5. As the study locations are hazard-prone and people are used to having outside assistance (mostly after the disasters), they try to show their vulnerability more than in reality, hoping to get future assistance. This was one of the challenges of biased data, which has been avoided by cross-checking and validation by other members/relevant stakeholders of the community.

6. Specific geographical settings: The research fieldwork was conducted in the southwest coastal areas of Bangladesh, under the country’s six hotspots. The coastal area settings are different from other areas of Bangladesh. Therefore further research in different settings may be necessary to confirm the applicability of the research findings.
7.6 Further Research

This research found that human well-being is also associated with the freedom of choice of individuals and communities and has a greater influence on coping and adaptation to climate change impacts. Nonetheless, freedom of decision-making can enhance basic capabilities like access to education, health and income to become less vulnerable to the climatic hazards in a region. Capability is multidimensional, which includes social and economic dimensions simultaneously and other dimensions, like capabilities related to nutrition, access to clean water, information and knowledge and social network, etc. This research data analysis attracts some issues for future research. One is measuring the extent of choice from a given capability set or measuring opportunity freedom considering the given capability set in a given context. The Bangladesh Delta Plan 2100 mentioned six hotspots in Bangladesh considering similar natural hazards and climate risks. Future research can consider these hotspots to contribute to climate resilience and human development in Bangladesh.

This research suggests that further research on climate change adaptation and resilience following a capability approach framework for human well-being is necessary, as Bangladesh is one of the most vulnerable countries to the impacts of climate change as the frequency and intensity of climatic hazards are increasing in Bangladesh.

Furthermore, this shows that more research is needed in social protection, gender quality participatory decision-making and enhancement access to basic capabilities that can contribute to reducing risk and vulnerability to climate change impacts in Bangladesh.

Nonetheless, this research will encourage readers and researchers to conduct further research on the capability approach, especially in the Bangladeshi context, where only partial and limited work has been done.
7.7 References of Chapter 7


ANNEXURE

Annex-1: Questionnaire for data collection

Data Collection for PhD Research
Department of Governance and Technology for Sustainability (CSTM)
Faculty of Behavioural, Management and Social Sciences (BMS)
University of Twente, the Netherlands
[The result of this survey will be used only in the doctoral thesis of M. Assaduzzaman (Asad) at the University of
Twente, The Netherlands]

Questionnaire on Livelihood Analysis of Rural Households in Coastal Districts (Khulna, Bagerhat
and Satkhira) in Bangladesh

Informant’s Information

Name of the Household (HH) Head………………………………………..
Respondent’s name:………………………..Sex:……..Male/Female;
Age:……………………………
Father/ husband’s name:……………………………..
Ethnicity:…………………………………………..Type of the
Household:………………………………..
Village/para/area/ward no.:……………………………………..

A) Location

Itinerary (How to find the
household):……………………………………………………………………………………………………..

...........................

..........

Distance (in meters/passes): to nearby market (with name):

(Describe the location of the compound/house, considering :)

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**B) Household Determination**

Use the questions in a flexible way and take time to let the respondents explain the household situation.

(Draw a genealogical diagram on the flip side of the questionnaire)

1) How many people are living in this house/compound?

2) Do you farm together?.................................................................Yes / No

3) Do you all use the same granary (-ies) or store room?.....................Yes / No

4) Do you cook together?.................................................................Yes / No

□ Is the house/compound divided into several sections (‘households’)……Yes / No□

□ If yes, how many?...........................................................................

5) Are there any absent household members?......................................Yes / No

(Determine whether or not to consider them part of the HH, using questions 6, 7 and 8)

6) Why are they absent (seasonal/ temporary labour migration, professional transfer, permanent migration, education, staying with family elsewhere, splitting up the household, starting own household)?

7) Are they absent for a period longer than 6 months......................... Yes / No

8) (If ‘yes’) Are they part of a household in the place where they stay?........ Yes / No

(If ‘yes’: Do not consider as Member)

9) Do some present HH-members stay in the house for less than 6 months a year?......... Yes / No

(Determine whether or not to consider them part of the household, using Questions 10 and 11)

10) Why do they leave the house (seasonal/ temporary labour migration, professional transfer, permanent migration, education, staying with family elsewhere, splitting up a household, start own household)?

..........................................................................................................................

11) Are they part of a household in the place where they usually go?

......................................................Yes / No

(If ‘yes’: Do not consider as HH-member)
(Decide who to consider as part of the household)

12) How many people are part of this ‘household’?
(This will be the research unit for the rest of this questionnaire)
C) Household Characteristics:

<table>
<thead>
<tr>
<th>No</th>
<th>Name of the HH members</th>
<th>Relation to HH-head</th>
<th>Age</th>
<th>Place of birth</th>
<th>Education completed</th>
<th>Education uncompleted</th>
<th>Main (economic) activity</th>
<th>Other (economic) activities</th>
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</tr>
</tbody>
</table>
D) Household History (link to migration/displacement)

*Use these questions in a flexible way to describe the settlement and family history of the household.*

1) When and how did you start your household?
   .................................................................................................................................
   .................................................................................................................................

2) Where was that?
   .................................................................................................................................

*(If in the present village: Go to 6; if not: Go to 3)*

3) What were your main economic activities in that place?
   .................................................................................................................................

4) When did you leave that place?
   .................................................................................................................................

5) Why did you leave that place?
   .................................................................................................................................
   .................................................................................................................................

6) Have you and your household also lived in any other place?
   ............................................ Yes / No
   *(If ‘no’: Go to section E)*

7) Where was that?
   .................................................................................................................................

8) What were your main economic activities in that place?
   .................................................................................................................................

9) When did you move to that place?
   .................................................................................................................................

10) When did you leave that place?
    .................................................................................................................................

11) Why did you leave that place?
    .................................................................................................................................
➢ Place of residence of absent brothers/children (Use genealogical diagram): ………………………
➢ Father’s occupation: ……………………………………………………………………………………………… …
➢ Seasonal labour migration in the past: …………………………………………………………………………

E) Farm Characteristics and Land Tenure
1) Do you own land?
……………………………………………………………………………………….. Yes / No
2) Do you farm?
……………………………………………………………………………………….. Yes / No

If 1 = ‘yes’ & 2 = ‘yes’: Go to 3
Go to 4
If 1 = ‘no’ & 2 = ‘yes’:
If 1 = ‘yes’ & 2 = ‘no’: Go to 6
Go to section F
If 1 = ‘no’ & 2 = ‘no’: Go to

3) Do you also have farmland that you do not own? ……………………… Yes / No
If ‘no’:
Go to 5
4) Under what arrangement do you use this land?
……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………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7) Could you tell the long-term changes over time of the following items:

*(Compares with the time that)*

*(Choose an event in household history)*

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<th>+ □ -</th>
<th>+ □ -</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice area + yield</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheat area + yield</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jute area + yield</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fisheries area (pond)</td>
<td>+ □ -</td>
<td></td>
</tr>
<tr>
<td>vegetable area + yield</td>
<td>+ □ -</td>
<td></td>
</tr>
<tr>
<td>Amount + fertility of the</td>
<td>+ □ -</td>
<td></td>
</tr>
<tr>
<td>(Non-) household labour</td>
<td>+ □ -</td>
<td></td>
</tr>
</tbody>
</table>

8) Status of livelihood and causes of poverty of the family

<table>
<thead>
<tr>
<th>Wealth Category</th>
<th>(Use tick mark)</th>
<th>Monthly Income (Tk.)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rich</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium Rich</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marginal Poor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extreme Poor</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9) What are the causes of the poverty of your family?
Farm Plots Large (7.7 acres or more)/ Medium (2.5 to 7.49 acre)/ Small (1.5 to 2.49 acre)/ Marginal (0.5 to 1.49 acre and Landless farm (0.0 to 0.49 acre) (Of past growing season). For non-cultivated plots, fill in the form until “Crops”.

<table>
<thead>
<tr>
<th>Plot no.</th>
<th>Size (acres)</th>
<th>Use (past year) (a)</th>
<th>Distance to HH</th>
<th>Soil type</th>
<th>Fertility</th>
<th>How</th>
<th>Tenure</th>
<th>Crops (in)</th>
<th>Sowing</th>
<th>Harvest</th>
<th>Harvest Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>3</td>
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<td>4</td>
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<td>5</td>
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<td></td>
</tr>
</tbody>
</table>

A. Use (past year)
1) Food crop 2) Cash crop 3) Grazing 4) Fallow 5) Not used 6) Given out 7) Other (specify)

B. “Distance to the water table.”
1) open water/ pond/ river 2) Shallow tube-well 3) Deep tube well 4) Paddle pump irrigation 5) Other (specify)

C. Soil type
1) Gravel 2) Sand 3) Loam 4) Clay

D. Fertility
1) Describe per plot 2) Rank plots 3) Permitted 4) Gift

E. How acquired?
1) Inherited 2) Permission asked 3) Purchased 4) Gift

F. Tenure Situation
1) Usufruct from GoB 2) Usufruct from the farm owner 3) Privately owned

G. Harvest Quantity
1) Describe (bumper, good, bad, failure, etc.) 2) Number of bags/bowls

152
F) Livestock

1. Do you own animals? ................................................................. Yes / No
   .............................................................................................................. If ‘yes’: Go to form: If ‘no’: Go to 2
2. Did you own animals in the past? .............................................................. Yes / No
   .............................................................................................................. If ‘yes’: go to 3; if ‘no’: go to section G
3. How did you lose your animals? ..........................................................................................................

Animal Form

<table>
<thead>
<tr>
<th>Type</th>
<th>No. of Grown animals</th>
<th>No. of young animals</th>
<th>No. of animals 10 years ago (incr./decr./eq.)</th>
<th>Use (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chickens</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ducks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goats</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheep</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cows</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buffalos</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pigs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cattle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A. Use of livestock
1) Meat (consumption) 5) Manure 9) Slaughter to hire farm labour
2) Milk/eggs (consumption) 6) Saving 10) Other (specify)
4) Milk/eggs (selling) 7) Animal traction 8) Social obligations

4. Did you own more animals in the past? (Choose an event/period in hh-history; ask to explain the trend)
   ..........................................................................................................................

5. Are you sometimes forced to sell animals to buy grains to feed your family
   ..........................................................................................................................
### G) Income-Generating Activities

#### a) Cash-Income Generating Activities

<table>
<thead>
<tr>
<th>Household member (who?)</th>
<th>Activity (source of income)</th>
<th>Seasonality (when the activity is carried out)</th>
<th>Estimate of income level per time unit</th>
<th>Estimate of time invested</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crop sales</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Animal sales</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wage/Farm labour</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Small business</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Richshaw, van, cart puller</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fishing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Handicrafts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Service</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Remittance</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Pension</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Labour migration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### b) Non-cash Income Generating Activities

1. Is any household member part of a farming group? ................................................................. Yes / No
2. Did any of you work on other people’s farms in exchange for food? ......................... Yes / No
3. Did other people come to work on your farm just as much? ........................................ Yes / No
4. Did you get any food from hunting/fishing (specify)? ......................................................... Yes / No
5. Did you get any food from the gathering (specify)? ................................................................. Yes / No
6. Did you get food from other activities (fruit trees, gardening)? ........................... Yes / No
7. Did you get any goods (incl. foodstuff) by exchanging them for other goods? ......... Yes / No
8. If yes: Which goods did you give and which did you receive? .......................................................... .
9. Did you receive any food aid (not only this year)? .................................................................
c) Trends in Income Generating Activities

- Has your non-farm income increased, decreased or stayed the same over time (describe the trend)?

- Has the **number** of income sources for your household increased, decreased or stayed the same over time (describe the trend)?
### H) Cash Expenditure (past year)

*(Ask respondent(s) about their main cash needs and locate them in the form: use as a checklist)*

<table>
<thead>
<tr>
<th>Type of expenditure</th>
<th>Estimate of costs</th>
<th>Seasonality of expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Staple foods</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fish/ Meat</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Other food:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prepared food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Health / Medicine</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Consumer goods:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clothes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cosmetics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>others</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Firewood/kerosene</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Weddings/funerals</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gifts</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Housing: repairs &amp;</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Productive investments</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Electricity bills</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Repay of loans</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Others:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Which types of expenditure have increased most sharply over time?
  
- In the past ten years, how many years did you have to buy grains?
  
- How many times were you able to sell surplus grains?
I) Possessions

Indicate whether the household possesses the following items and how many.

<table>
<thead>
<tr>
<th>Item</th>
<th>Item</th>
<th>Item</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motorcycle</td>
<td>Lantern</td>
<td>Motor/power tiller</td>
<td>Refrigerator/freezer</td>
</tr>
<tr>
<td>Rickshaw van</td>
<td>Tube-well for irrigation</td>
<td>Wooden plough</td>
<td>Boat/ Engine boat</td>
</tr>
<tr>
<td>Auto-rickshaw</td>
<td>TV/Radio</td>
<td>Iron-sheet roofing</td>
<td>Fan</td>
</tr>
<tr>
<td>Bicycle</td>
<td>Flashlight</td>
<td>Modern furniture</td>
<td>Mobile/cell phone</td>
</tr>
<tr>
<td>Cart</td>
<td>Sewing machine</td>
<td>Bank savings</td>
<td>Fishing net</td>
</tr>
<tr>
<td>Solar Panel</td>
<td>Ornaments/gold</td>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

1. Are you sometimes forced to sell possessions because you need the cash? 
   ........................................ Yes / No............................................................ If no: Go to 3 
   ........................................................................................................................................ 
   ........................................

2. Have there been years that you were forced to sell much more possessions than usual? Yes / No 
   ........................................................................................................................................ 
   ........................................

3. Have your possessions increased, decreased or stayed the same over time? 
   ........................................

J) Climate Change Impacts & Adaptation

1. Do you perceive the change in the Environment or climate change? Yes/No (if yes, then explain as much as you can)........................................................................................................................................... 
   ........................................

2. Do you know about “Climate Change (CC)”? .................Yes/No, (if yes). What is meant by “Climate Change (CC)”?
   ........................................................................................................................................ 
   ........................................

3. What kind of problems/ calamity was created by CC? What are the impacts (past and present) of the changing environment/ climate change (CC)?
   ........................................................................................................................................ 
   ........................................

7. What else can happen soon (considering CC impacts)?
   ........................................................................................................................................ 

8. What was the response to hazards in the past? What would be your response to this severe situation if you get worse with CC? Is it also different from what it was before to respond to those hazards?
   ........................................................................................................................................ 

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9. Do you think there are any impacts of CC on poverty? .........................Yes/ No

If yes, how and at what level does climate change affect low-income people?

<table>
<thead>
<tr>
<th>CC Events</th>
<th>Severe</th>
<th>Moderate</th>
<th>Low</th>
<th>Very low</th>
<th>Future probable impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sea level Rise</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saltwater Intrusion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salinity</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cyclones/ Storms surge</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Flood</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Water Logging</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Drought</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Erratic rainfall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat waves/ Temp. rise</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cold waves</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**K) Vulnerability, Social Capital and Reliance on Networks in case of shock/disasters**

<table>
<thead>
<tr>
<th>QID</th>
<th>Questions</th>
<th>Response</th>
<th>Response Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>K1</td>
<td>Major events and past shocks: During the last five years, did any of the following events occur in your household?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K1.1</td>
<td>Marriage of the first degree relative to household head or spouse, if yes, how many marriages</td>
<td># of marriages. If no, write, 0</td>
<td></td>
</tr>
<tr>
<td>K1.2</td>
<td>Birth of own child: if yes, how many marriages?</td>
<td># Of birth, If no, write, 0</td>
<td></td>
</tr>
<tr>
<td>K1.3</td>
<td>Birth of own child: if yes, how many during the past 3 years?</td>
<td># Of adaption, If no, write, 0</td>
<td></td>
</tr>
<tr>
<td>K1.4</td>
<td>We inherited major funds or assets.</td>
<td>Taka If no, write, 0</td>
<td></td>
</tr>
<tr>
<td>K1.5</td>
<td>We received dowry</td>
<td>Taka If no, write, 0</td>
<td></td>
</tr>
<tr>
<td>K1.6</td>
<td>Did your household give dowry in the past 3 years? Interviewer: if yes, prompt for its value</td>
<td># Of deaths. If no, write, 0</td>
<td></td>
</tr>
<tr>
<td>K1.7</td>
<td>Death of a working adult member. If yes, how many?</td>
<td># Of months. If no, write, 0</td>
<td></td>
</tr>
</tbody>
</table>
| K.1.8 | Serious (but not chronic) illness of a working (temporary, but longer disability to work for at least 1 month). If yes, how many months during the past 3 years could he or she not work (Max is 36 for one member) | Yes……………1  
No…………….2 |
| K.1.9 | Occurrence of a serious chronic illness or major disability (e.g. blindness, lost an arm because of accident) of any household member | Yes……………1  
No…………….2 |
| K.1.10 | A major working income-earning adult member left the household forever (e.g. husband and wife got separated during past 3 years) | # Of deaths.  
If no, write 0 |
| K.1.11 | Death of dependent member (child/older person)  
If yes, how many previous household members? | Yes……………1  
No…………….2 |
| K.1.12 | Relocation of residence/house because of violence (e.g. war, domestic violence) that forced household members to leave their previous residence and move into this new residence/house | Yes……………1  
No…………….2 |
| K.1.13 | Relocation of residence/house for other reasons such as natural disasters (cyclone, flood, drought etc.) | Yes……………1  
No…………….2 |
| K.1.14 | During the last 3 years, did your household have a very serious problem or failure in crop production (sickness causing Failure of harvest, flood, drought, etc.)? | Yes……………1  
No…………….2 |
| K.1.15 | During the last 3 years, did your household have a serious problem or failure in animal production (e.g., sickness or death or theft of many or valuable animals)? | Yes……………1  
No…………….2 |
| K.1.16 | During the last 3 years, did your household have a serious problem or failure in your micro-enterprise? | Yes……………1  
No…………….2 |
### L) Access to Goods and Services:

<table>
<thead>
<tr>
<th>QID</th>
<th>Questions</th>
<th>Response</th>
<th>Response Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>Education/Schools</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>L2</td>
<td>Health services? Clinics</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>L3</td>
<td>Housing assistance</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>L4</td>
<td>Job training/ employment</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>L5</td>
<td>Credit/ Finance</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>L6</td>
<td>Transportation</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>L7</td>
<td>Water distribution</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>L8</td>
<td>Sanitation services</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>L9</td>
<td>Agricultural extension</td>
<td>Yes</td>
<td>1</td>
</tr>
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<tr>
<td></td>
<td></td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>L10</td>
<td>Justice/ conflict resolution</td>
<td>Yes</td>
<td>1</td>
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<tr>
<td></td>
<td></td>
<td>No</td>
<td>2</td>
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<tr>
<td>L11</td>
<td>Security /policy services</td>
<td>Yes</td>
<td>1</td>
</tr>
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<tr>
<td></td>
<td></td>
<td>No</td>
<td>2</td>
</tr>
</tbody>
</table>

### M) Estimates of objective and subjective poverty

<table>
<thead>
<tr>
<th>QID</th>
<th>Questions</th>
<th>Response</th>
</tr>
</thead>
</table>
| M1  | You are concerned about your expense relative to food; which of the following is true (reflects most accurately the household situation)? Please read, then circle the appropriate one. |          | Your expenses are below the household's need........1  
Your expenses are on the average comparable to your household's need........2  
Your expenses exceed your household's need........3 |
| M2 | You are concerning your expense relative to clothing; which of the following is true (reflects most accurately the household situation)? |
|    | Please read, then circle the appropriate one. |
|    | Your expenses are below the household’s need...........1 |
|    | Your expenses are on the average comparable to your household’s need...........2 |
|    | Your expenses exceed your household’s need...........3 |

| M3 | You are concerning your expense relative to health care; which of the following is true (reflects most accurately the household situation)? |
|    | Please read, then circle the appropriate one. |
|    | Your expenses are below the household’s need...........1 |
|    | Your expenses are on the average comparable to your household’s need...........2 |
|    | Your expenses exceed your household’s need...........3 |

| M4 | You are concerning your expense relative to children’s education; which of the following is true (reflects most accurately the household situation)? |
|    | Please read, then circle the appropriate one. |
|    | Your expenses are below the household’s need...........1 |
|    | Your expenses are on the average comparable to your household’s need...........2 |
|    | Your expenses exceed your household’s need...........3 |

| M5 | You are concerning your expense relative to the housing; which of the following is true (reflects most accurately the household situation)? |
|    | Please read, then circle the appropriate one. |
|    | Your expenses are below the household’s need...........1 |
|    | Your expenses are on the average comparable to your household’s need...........2 |
|    | Your expenses exceed your household’s need...........3 |

| M6 | How much does your household need per month to live (to meet all basic needs adequately)? Interviewer: Explain basic needs, i.e., adequate shelter, clothing, and sufficient food in quantity and quality. |
|    | Taka |

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### N) Migration

1. Have any members of this household left the area for over a month **in the past year**? ................. Yes / No
   *If ‘yes’: Go to the first form; If ‘no’: go to Question 2*

<table>
<thead>
<tr>
<th>Name of migrant</th>
<th>Destination</th>
<th>Time interval (months)</th>
<th>Activity/motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

2. Have any members of this household left the area for over a month **in the past 10 years**? ........ Yes / No
   *If ‘yes’: Go to the second form; If ‘no’: go to Section K*

<table>
<thead>
<tr>
<th>Name of migrant</th>
<th>Destination(s)</th>
<th>How often in past 10 years?</th>
<th>Activity/motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

*(If only one household member has left the area in the past ten years, then ask 😊)*

3. Could you describe the household situation (**food/labour/cash**) in years that s/he (or you) left the area?........
   .................................................................................................................................
   .................................................................................................................................
   *If several household members have left the area in the past ten years, then ask 😊*

4. In what household situations (**food/labour/cash**) was temporary migration more frequent?
   ......................................................................................................................................................
   ......................................................................................................................................................

5. Is the decision to leave the area also influenced by other factors temporarily?
   ......................................................................................................................................................

6. What are the barriers, and what are the reasons that make them move?
   ......................................................................................................................................................

7. Who influences the decision /decides to leave the area considering the factors /circumstances temporarily?
   ......................................................................................................................................................
8. Is the migrant expected to send home food or money, or can s/he use all her/his earnings for personal expenses? .................................................................

9. How much does s/he (or you) usually earn in one trip *(if several trips a year, then sum up and specify)*? ..... .................................................................

10. Has the importance of migration and remittances for the household increased, decreased or stayed the same over time? *(Explain)*.................................................................

11. *Did any village service providers/professional/important personnel migrate in the meantime? Why And what are the impacts on the society?*

**M) Family Networks (social networks also can be assessed)**

1. Do you have relatives in the village? .............................................. Yes / No
   *If 'no': Go to 2* ........................................................................................................

2. Do you help each other with farm- or other work? ......... Yes / No
   .................................................................................................................................
   b) Do you give or receive food to/from these relatives? .......... Yes / No
   .................................................................................................................................
   c) Do you give or receive cash to/from these relatives.......... Yes / No
   .................................................................................................................................
   d) Have these forms of mutual aid increased, decreased or stayed the same over time? ............
   .................................................................................................................................

3. Do you have relatives outside the village (other villages/cities)? ..... Yes / No
   .......If 'no': Go to 3 ........................................................................................................
   a) Do you help each other with farm- or other work? ..........Yes / No
   .................................................................................................................................
   b) Do you give or receive food to/from these relatives? .......... Yes / No
   .................................................................................................................................
   c) Do you give or receive cash to/from these relatives.......... Yes / No
   .................................................................................................................................
   d) Have these forms of mutual aid increased, decreased or stayed the same over
time?
...........................................................................................................................

4. Do you have relatives outside the village? ........ Yes / No ........
   If ‘no’:  Go to 4
...........................................................................................................................

5. Do you help each other with farm- or other work? ........ Yes / No
   b) Do you give or receive food to/ from these relatives? ........ Yes / No
   c) Do you give or receive cash to/ from these relatives ............ Yes / No
   d) Have these forms of mutual aid increased, decreased or stayed the same over
time? ..............
...........................................................................................................................

6. Do you have relatives who live outside Bangladesh?............... Yes / No
...........................................................................................................................

7. Do you receive their help (money, consumer goods, explain trend)?
...........................................................................................................................
Annex-2: Climate Change Stress in the Coastal Areas of Bangladesh

<table>
<thead>
<tr>
<th>Climate Change Stress</th>
<th>Vulnerability to Livelihoods</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cyclone and tidal surge</strong></td>
<td><strong>Impacts on Agriculture (including livestock and fisheries)</strong></td>
</tr>
<tr>
<td></td>
<td>- Damages to crops, fisheries (culture ponds washed away) and livestock dies/loss</td>
</tr>
<tr>
<td></td>
<td>- Freshwater scarcity for crops</td>
</tr>
<tr>
<td></td>
<td>- Scarcity of fodder</td>
</tr>
<tr>
<td></td>
<td>- Shelter scarcity for the livestock</td>
</tr>
<tr>
<td></td>
<td><strong>Impacts on Water Resources</strong></td>
</tr>
<tr>
<td></td>
<td>- Overflows surface water resources</td>
</tr>
<tr>
<td></td>
<td>- Lack of freshwater for irrigation</td>
</tr>
<tr>
<td></td>
<td><strong>Impacts on Human Health</strong></td>
</tr>
<tr>
<td></td>
<td>- Outbreaks of water-borne diseases (cholera, diarrheal, skin disease)</td>
</tr>
<tr>
<td></td>
<td>- Women, older people, children, and the disabled mostly affects</td>
</tr>
<tr>
<td></td>
<td><strong>Impacts on Environment</strong></td>
</tr>
<tr>
<td></td>
<td>- Biodiversity loss</td>
</tr>
<tr>
<td></td>
<td>- Disruption of ecosystems</td>
</tr>
<tr>
<td></td>
<td><strong>Impacts on Economics</strong></td>
</tr>
<tr>
<td></td>
<td>- People become workless (especially the wage labourer)</td>
</tr>
<tr>
<td></td>
<td><strong>Impacts on Infrastructures (road/communication)</strong></td>
</tr>
<tr>
<td></td>
<td>- Road communications often disrupts (mainly the earthen roads)</td>
</tr>
<tr>
<td></td>
<td>- Tree branches, trees fall in the road also, which blocks emergency communications</td>
</tr>
<tr>
<td><strong>Salinity</strong></td>
<td><strong>Impacts on Agriculture (including livestock and fisheries)</strong></td>
</tr>
<tr>
<td></td>
<td>- Reduces soil fertility</td>
</tr>
<tr>
<td></td>
<td>- Reduce crop production due to salinity in the soil</td>
</tr>
<tr>
<td></td>
<td><strong>Impacts on Water Resources</strong></td>
</tr>
<tr>
<td></td>
<td>- Salinity in surface water and groundwater (by leaching)</td>
</tr>
<tr>
<td></td>
<td>- Drinking water scarcity</td>
</tr>
<tr>
<td></td>
<td>- Freshwater scarcity for household use</td>
</tr>
<tr>
<td></td>
<td><strong>Impacts on Human Health</strong></td>
</tr>
<tr>
<td></td>
<td>- Due to drinking water scarcity, people can’t take enough water they need to keep good health</td>
</tr>
<tr>
<td></td>
<td>- Pregnant mother suffers due to access to sodium chloride intake through water (miscarriage, germination and growth of most of the crops and tree varieties hampers (except the saline tolerant one)</td>
</tr>
<tr>
<td></td>
<td>- Biodiversity decreases</td>
</tr>
<tr>
<td></td>
<td><strong>Impacts on Environment</strong></td>
</tr>
<tr>
<td></td>
<td>- Lack of available drinking water sources, women usually fetch water from distant places; therefore, they lose their</td>
</tr>
<tr>
<td></td>
<td><strong>Impacts on Infrastructures (road/communication)</strong></td>
</tr>
<tr>
<td></td>
<td>- Salinity make the dust soil by decreasing the cohesion of the soil particle; thus, the roads become dusty and quick erosion happens</td>
</tr>
<tr>
<td>Climate Change Stress</td>
<td>Vulnerability to Livelihoods</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td><strong>Impacts on Agriculture (including livestock and fisheries)</strong></td>
<td><strong>Impacts on Water Resources</strong></td>
</tr>
</tbody>
</table>
| Late rainfall and lack of rainfall | - Soil becomes more saline  
- Disruption of cultivation  
- Seed germination and growth  
- Loss of crops  
- Reduced yields | - Low level of water or no water in ponds and mini-ponds  
- Water quality and quantity deteriorate (salinity increases, quantity decreases)  
- Dis-functioning of tube-wells | - Scarcity of drinking water  
- People drink saline water and become sick, especially low-income people (they can't effort to buy water jar)  
- due to lack of rainfall and high-temperature, plants burn/die, and the ecosystem disrupts | - Due to the scarcity of drinking water, it has to fetch water from distant places; therefore, it needs more time to fetch drinking water, which impacts low-income people's livelihood | - The roads become so hot with the high temperature, and the asphalt melts |
<table>
<thead>
<tr>
<th>Climate Change Stress</th>
<th>Impacts on Agriculture (including livestock and fisheries)</th>
<th>Impacts on Water Resources</th>
<th>Impacts on Human Health</th>
<th>Impacts on Environment</th>
<th>Impacts on Economics</th>
<th>Impacts on Infrastructures (road/communication)</th>
</tr>
</thead>
<tbody>
<tr>
<td>excessive rainfall</td>
<td>- Heavy rainfall in short time causes damage to the crop</td>
<td>- Huge surface runoff</td>
<td>- Disease spreads in the dam weather, especially the water-borne and skin diseases</td>
<td>- Together with humans, plants and animals also suffer from flooding</td>
<td>- Wage labourers have no available works</td>
<td>- Sometimes, during the flood, roads submerge, and communication disrupts</td>
</tr>
<tr>
<td></td>
<td>- Excessive rainfall submerges the vegetables and crops for several days</td>
<td>- Quality of water deteriorates</td>
<td>- Flooding helps to spread germs</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
## Annexe-3: Adaptation to Livelihoods

<table>
<thead>
<tr>
<th>Climate Change Stress</th>
<th>Adaptation for Agriculture (including livestock and fisheries)</th>
<th>Adaptation for Water Resources</th>
<th>Adaptation for Health (human health)</th>
<th>Adaptation for Environment</th>
<th>Adaptation for Economic</th>
<th>Adaptation for Infrastructures (road/communicatio etc.)</th>
</tr>
</thead>
</table>
| **Cyclone and tidal surge** | - Seed preservation for disasters  
- Cyclone-proof housing/shed for animals  
- If not possible to save the animals, then set the free during cyclones/storms  
- Raising the pond side (bank of the pond) and fencing through the netting to resist the fish from going out during cyclone/tidal surge  
- Raise the flood-free seedbed  
- To follow the cyclone warning system | - Plinth raising of tube-well, raising the pond boundary  
- During the depression, necessary preparedness measures to save water resources (tube wells, ponds and PSFs)  
- | - Preserve household medicines  
- Preserve dry food  
- Saving important documents  
- To learn how to prepare ORS (oral rehydration saline)  
- | - Saving the environment through conservation and plantation programs  
- | - Savings (money, food and fodder) for the disaster period and after the disasters  
- | - Maintenance of roads, bridges and culverts during normal time  
- Rise the road height, especially for the coastal regions  
- |
<table>
<thead>
<tr>
<th>Climate Change Stress</th>
<th>Adaptation to Livelihoods</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Salinity</strong></td>
<td></td>
</tr>
<tr>
<td>- Saline tolerant varieties selection and seed collections and preservation</td>
<td></td>
</tr>
<tr>
<td>- Short term crops selection and seed conservation</td>
<td></td>
</tr>
<tr>
<td>- Practice mulching system</td>
<td></td>
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<tr>
<td>- Prepare seed has been on high land</td>
<td></td>
</tr>
<tr>
<td>- Rain Water Harvesting (RWH)</td>
<td></td>
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<tr>
<td>- Raising pond boundaries so that saline water can be restricted</td>
<td></td>
</tr>
<tr>
<td>- Maintenance of Ponds, RWH tanks</td>
<td></td>
</tr>
<tr>
<td>- Prepare PSF (Pond Sand Filter)</td>
<td></td>
</tr>
<tr>
<td>- Practicing water filtering systems to avoid water bone diseases</td>
<td></td>
</tr>
<tr>
<td>- Drinking boiled water</td>
<td></td>
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<tr>
<td>- Collect and use water-purifying tablets</td>
<td></td>
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<tr>
<td>- Collect, preserve and use ALUM (used for water purification)</td>
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<tr>
<td>- Household and roadside plantation</td>
<td></td>
</tr>
<tr>
<td>- Plantation in the highlands/space s</td>
<td></td>
</tr>
<tr>
<td>- Saline tolerant plant varieties selection and plantation (plum, Azadirecta sp. etc.)</td>
<td></td>
</tr>
<tr>
<td>- Keep savings</td>
<td></td>
</tr>
<tr>
<td>- Selection of alternative livelihood options and</td>
<td></td>
</tr>
<tr>
<td>- Earning from the alternative occupation</td>
<td></td>
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<tr>
<td>- To resist erosion, saline tolerant grass selection and plantation in the earthen roads, and constructed roadsides</td>
<td></td>
</tr>
<tr>
<td>- Maintenance of the roads, culverts and bridges</td>
<td></td>
</tr>
<tr>
<td><strong>Late rainfall and lack of rainfall</strong></td>
<td></td>
</tr>
<tr>
<td>- Excavation and re-excavation of ponds and ditches to capture</td>
<td></td>
</tr>
<tr>
<td>- Excavation and re-excavation of ponds and ditches to capture</td>
<td></td>
</tr>
<tr>
<td>- Drink sufficient water</td>
<td></td>
</tr>
<tr>
<td>- Plantation in the household areas to keep the microclimate</td>
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<tr>
<td>- Keep savings</td>
<td></td>
</tr>
<tr>
<td>- Selection of</td>
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</tr>
<tr>
<td>- Roadside plantation</td>
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<tr>
<td>Climate Change Stress</td>
<td>Adaptation to Livelihoods</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td><strong>Adaptation for Agriculture (including livestock and fisheries)</strong></td>
<td>freshwater/rainwater for agriculture - Drought tolerant varieties selection and cultivation - Practices low irrigation cultivation of crops and vegetables</td>
</tr>
<tr>
<td><strong>freshwater/rainwater for agriculture</strong></td>
<td>- Drought tolerant varieties selection and cultivation - Practices low irrigation cultivation of crops and vegetables</td>
</tr>
<tr>
<td><strong>freshwater/rainwater for agriculture</strong></td>
<td>- Take ORS if needed</td>
</tr>
<tr>
<td><strong>Adaptation for Water Resources</strong></td>
<td>cool and convenient</td>
</tr>
<tr>
<td><strong>Adaptation for Health (human health)</strong></td>
<td>alternative livelihood options and -Earning from the alternative occupation</td>
</tr>
<tr>
<td><strong>Adaptation for Environment</strong></td>
<td>-Raising the pond boundaries to resist the intrusion of unclean and dirty water - Use clean water for cooking, drinking and household cleanliness</td>
</tr>
<tr>
<td><strong>Adaptation for Economic(s)</strong></td>
<td>-Build latrines in the high/flood-free places - Maintain hygiene for family and community to avoid spreading disease</td>
</tr>
<tr>
<td><strong>Adaptation for Infrastructures (road/communication etc.)</strong></td>
<td>-Keep the environment clean/ cut the bushes so that mosquitoes/dengue do not spread out - Spray insecticides in the bushes to control dengue/mosquito (only those who have the ability/ not everyone)</td>
</tr>
<tr>
<td><strong>excessiv e rainfall</strong></td>
<td>-Repair the weak and vulnerable sections of the roads</td>
</tr>
<tr>
<td><strong>-Seedbed preparation in the high and flood-free land</strong></td>
<td>-Cover the seedlings in the seedbed - Repair the cowshed if needed - Prepare to save the ponds and fishes from overflooding</td>
</tr>
<tr>
<td><strong>-Raising the pond boundaries to resist the intrusion of unclean and dirty water</strong></td>
<td>- Take ORS if needed</td>
</tr>
<tr>
<td><strong>-Build latrines in the high/flood-free places</strong></td>
<td>- Keep savings - Selection of alternative livelihood options and - Earning from the alternative occupation</td>
</tr>
</tbody>
</table>

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Annex-4: Household water use and collection (pond water use & traditional rainwater harvesting)
Photo: A. Household water collection (from tube-well) and B. from pond sand filter (PSF)
C. Household water use and D. rainwater harvesting for drinking water (down)
Annexe-5: Vulnerability and livelihoods (photos)

Photo: Livelihoods depending on natural resources (fish fry collection, crab let collection from the mangrove forest)
Photo: Shrimp Farming (up) and dry shrimp farms (below)
Photo: Local settlements

Photo: boat to cross the river
Annex-6: ABOUT THE AUTHOR

MOHAMMAD ASSADUZZAMAN
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Email: m.assaduzzaman@utwente.nl

Mohammad Assaduzzaman is a development practitioner with wide national and international experience and involvement in Sustainable Development, Climate Change (adaptation, mitigation, migration, finance), Environment, Disaster Risk Reduction and Resource Management. He has a particular academic interest in people-centred human development and capabilities, environmental and climate justice, equity, people’s participation, environment and climate change-related conflict sensitivity and governance issues. He also works in capacity building and institutional development at national and regional levels.

He is a professional with more than 15 (fifteen) years’ substantive experience, including more than 12 ( Twelve) years working in the areas of climate change (Adaptation, migration, mitigation, finance) and disaster risk reduction management in Bangladesh.

He works with the Food and Agricultural Organization of the United Nations (FAO of the UN) as a National Climate Change Specialist in Bangladesh. Institutional strengthening, capacity enhancement, Preparation of the concept note and proposal development for accessing International and Green Climate Funds (GCF) are some of the core activities. He works closely with the public and private sectors in Bangladesh’s climate action, especially with the National Designated Authority (Economic Relations Division under the Ministry of Finance) and other national stakeholders in Bangladesh.

He has engaged with the national policy-making process. He coordinated reviewing and updating of the Bangladesh Climate Change Strategy and Action Plan (BCCSAP)- an apex national climate change document (while working with GIZ in Bangladesh), engaged in reviewing and updating of Standing Orders on Disasters (SoD) of Bangladesh, National
Adaptation Plan, etc. He is one of the authors of the Nationwide Climate Vulnerability Assessment (NCVA) and currently coordinating the review and update of the GCF Bangladesh Country Programme 2018. He also taught a graduate course on Environmental Policy and Planning at the State University of Bangladesh as an adjunct faculty.

Before the FAO of the UN, I served Asian Disaster Preparedness Center (ADPC) in its World Bank Funded project on Climate Adaptation and Resilience South Asia (CARE) in Bangladesh as a Climate Policy and Planning Specialist; Acclimatise-UK (Delhi Office in India) as a consultant, Research Fellow at Bangladesh Center for Advanced Studies (BCAS), Technical Advisor (Climate Change Policy Coordination) of GIZ (German International Development Cooperation), Consultant at Asian Development Bank and World Bank projects/studies. He worked with GIZ in its sustainable development and biodiversity conservation project as a senior advisor for climate change adaptation and disaster risk reduction. He also worked as a programme officer and research fellow with Bangladesh Disaster Preparedness Center (BDPC) and Bangladesh Center for Indigenous Knowledge (BARCIK).

In addition, he leads the development and implementation of projects and programmes, coordinates a wide range of partnerships amongst government actors, and recognized think tanks and CSOs for leading collaborative initiatives with the Ministry of Environment Forest and Climate Change (MoEFCC), Bangladesh Climate Change Trust (BCCT), and the Economic Relations Division (ERD) of Ministry of Finance which paved my way to deal various issues surrounding wider climate change matters in Bangladesh. He understands the interest and incentives of concerned actors that help design interventions to improve inclusiveness in public policy. As a part of his core functions, he developed the Theory of Change (ToC), Strategic Plan and Outcome menu, and steering budgets. He revised them in consultation with partners to adopt new opportunities and lead the preparation of annual and periodic reports. He maintains networks with policy counterparts, CSOs and advocacy platforms. Facilitate training, workshops, lead discussion(s), and necessary public events involving key actors from home and abroad. He has a Bachelor of Science in Agriculture (B. Sc. in Agriculture) from Sher-e- Bangla Agricultural University in Dhaka, Bangladesh and a Master of Science in Environmental
Science degree from Bangladesh. He also studied Master of Science in Asian Studies at Lund University in Sweden and a Master of Science in Sustainable Agriculture & Food Security from Bangladesh Agricultural University in Mymensingh, Bangladesh. All these experiences have endowed him to undertake challenging tasks and adapt to different working conditions in national, regional and international environments.
Summary

The main aim of the thesis is to explore how individual capabilities (in the sense of Amartya Sen) relate to poor people's ability to switch livelihoods in response to ecological and climate variability. Following the aim of the research, the objectives are formulated as: 'to investigate individual capabilities (freedom of choices) and to contribute to the ongoing human development knowledge related to risk, vulnerability and climate change adaptation at the local and regional level.'

Climate change is progressing. Its adverse impacts undermine lives and livelihoods worldwide, and its uneven geography raises a question of justice. The risk of climate change, it may be argued, will primarily fall on human beings who already face other existing or future environmental and economic stresses with insufficient coping mechanisms and limited adaptation capacities to survive with further loss and damage caused by climate change.

This thesis is based on the assessment of 'the Capability Approach (CA),' a normative framework developed by Amartya Sen, which has gained momentum in capability-related research and learning for human well-being, social, economic, environmental, and cultural opportunity as social justice, freedom, equality and quality of life. It helps to understand human well-being as a multidimensional phenomenon that a single indicator, such as income, cannot capture. Adopting and implementing the capability approach has the potential to apprehend the social, economic, and environmental dimensions of the lives and livelihoods of vulnerable populations in a country like Bangladesh for overall sustainable development. This research illustrated the capability framework to guide the methodological approach. Sen used the capability approach in the policy-oriented context and for articulating the Human Development Index (HDI). In development circles, the capability approach has provided foundations for the human development paradigm that regards human development as a process of enlarging people's freedom of choice.

This research describes the capability approach through fundamental concepts such as well-being, functionings, capabilities, freedom of choice, individual choice, and effects of matter conversion factors. The research explores how individuals can respond to environmental and climate variability by understanding what role freedom of decision plays in improving their well-being using a broad normative framework of the capability approach. And the most common use of the capability approach is to measure human well-being by expanding people's agency freedom. The thesis explores the capability approach framework by using it for assessing
adaptation, risk reduction, livelihoods, and individual well-being related to climate change migration and adaptation decision-making in line with the freedom of choice. No ready-made theory can smoothly be applied to these recent climate change and socio-economic phenomena. However, this capability approach framework can guide empirical research on these bounded issues. Through the empirical study, the thesis explores the capability approach framework for assessing adaptation, risk reduction, livelihoods, and individual well-being related to climate change migration and adaptation decision-making in line with the freedom of choice. No ready-made theory can smoothly be applied to these recent climate change and socio-economic phenomena. Still, this capability approach framework can guide empirical research on these bounded issues.

Bangladesh has been trying to mainstream climate change adaptation in different sectors (agriculture, health, water sanitation, biodiversity conservation, etc.) to reduce the adverse impacts of climate change on lives and livelihoods and also for climate resilient development in the country. Over the years, Bangladesh has made creditable efforts to streamline regulatory and institutional settings to achieve climate-resilient sustainable growth by developing required climate-related policies, strategies, and regulatory frameworks for climate change adaptation and mitigation. Furthermore, Bangladesh is trying to move the country's adaptation efforts from the local to the regional level following the location-specific vulnerability to climate change impacts. To name few of them are; the Bangladesh Climate Change Strategy and Action Plan (BCCSAP), the National Adaptation Programme of Action (NAPA), the National Adaptation Plan of Bangladesh (NAP), the Bangladesh Delta Plan 2100, and the Mujib Climate Prosperity Plan, etc.

This study describes the capability approach through fundamental concepts such as well-being, functionings, capabilities, freedom of choice, individual choice, and effects of matter conversion factors. People's responses to ecological and climate variability using the broad normative framework of the capability approach to understand the role of individual freedom of choice in enhancing personal well-being. The capability approach also interacts with environmental, social, and economic dimensions for well-being. The most common use of the capability approach is to measure human well-being by expanding people's agency freedom. Several governments, non-governments (NGOs), and community-based organizations (CBOs) are implementing adaptation programs for the people living in the coastal areas of Bangladesh. This capability approach will contribute to the shortcomings and gaps in knowledge by providing a framework that considers people's participation in determining
people’s well-being. The proposed framework is based on the central research question and sub-questions, which form the thesis chapters. In the thesis, the empirical chapters are organized around contemporary climate change concerns and responses in Bangladesh’s southwest coastal areas and analyzed through the lens of the capability approach. The individual chapter of the thesis clarifies the climate change issues, challenges, adaptation options, and initiatives. The literature review and the empirical work addressed several research objectives to reach the goal. In particular, a range of research questions has been answered. The research questions of the empirical chapters are as follows:

- **RQ1**: How does freedom of choice differ based on gender and ethnicity?
- **RQ2**: How may these two (gender & ethnicity) interact with each other under the adverse consequences of climate change, causing particular social groups, which originally resided in similar geophysical conditions, to be trapped in the unfavorable environment?
- **RQ3**: How do pull and push migration factors differ among various socio-economic groups?
- **RQ4**: Where is the border between migration as an adaptation option and forced migration?
- **RQ5**: How does the well-being of permanent migrants compare to the well-being of non-migrants?
- **RQ6**: How does the migration decision affect the well-being of the migrant group?

The exploratory research methodology used to understand the research topic better and helped identify critical variables, formulate hypotheses, and design the study. The study used a case study approach that allows for an in-depth analysis of the complex interplay of social, economic, and environmental factors affecting climate change adaptation and the application of the capability approach. However, the research also employs both qualitative and quantitative data collection and analysis methods and collects both primary and secondary data. The primary data collection involved two main methods: surveys and interviews. Qualitative and quantitative data collection methods were employed to collect data on the socio-economic conditions of the local people, climate change variability, stress and adaptation strategies at the family and community level, and the internal migrant population at the migration destination.
The research questions were addressed in the thesis’s empirical chapters following the population's capability, well-being, and conversion factors. Through the lens of the capability approach, the empirical chapters of the thesis focus on current climate change concerns and responses in Bangladesh, particularly in the coastal areas of Bangladesh. The topics of climate change and adaptation options are explained in a separate chapter from the thesis. Several research objectives to achieve this aim were discussed in the literature review and during the experimental work. The empirical chapters of the thesis, chapter 3-6, focuses on climate change adaptation, migration, gender and ethnicity, social-economic and location-specific vulnerability to the climate change impacts, and adaption initiatives and challenges—the causal relationship between the factors that influence and impact the decision-making process at individual and family level. Further discussion in the thesis is on access to resources and services and capability enhancement through freedom of choice, which facilitates local-level adaptation activities for resilience to climate change. Several general conclusions have emerged from the thesis as follows:

1. The findings reveal that layers of actors can prohibit even forced migration, leaving whole communities trapped in an unfavorable environment. This result has potential policy implications for disaster-prone countries like Bangladesh.
2. Using the perspective of Sen's CA, the research finds that several conversion factors significantly affect an individual's freedom to pursue valuable activities. There is scope to replicate the result for climate change adaptation at the local and regional levels, considering different contextual factors as conversion factors.
3. Social networks play a vital role in achieving livelihood well-being. Migrants miss their home (origin) after the migration because they are deprived of strong social networks in the migrated location and thus feel excluded from mainstream society. Mainstreaming social participation and social inclusion can contribute to human well-being.
4. We know climate change does not affect all human societies equally. From the research, it is revealed that access to services and opportunities also matters. So these are areas that government can intervene to ensure support and services to reduce people's vulnerability. Restricted and unequal access also increases people's vulnerability.
5. The literature review demonstrates that the CA is a normative framework and can be explored using several perspectives related to human well-being. For example, this research explored CA in the context of 'practical implications' following its fundamental concepts.
6. In the CA, development is seen as capability expansion, and poverty as capability deprivation. For adaptation to climate change and sustainable development at the local and regional level, CA can be used at the policy level and in implementation by the researcher, policy maker, and government and non-government organizations.

7. Lastly, the capability approach is a valuable framework for the researcher, policymaker, and practitioners to explore further implications concerning the uncertainty of climate change and its impacts on human well-being in different contexts.

The capability approach framework in climate change adaptation research and development in Bangladesh can benefit the country in achieving long-term sustainable development goals as one of the vulnerable countries to the impacts of climate change. This research has implication potential for relevant climate-vulnerable developing countries in Asia and the Pacific and delta countries, as the coastal areas are one of the major climate hotspots in Bangladesh and elsewhere relevant because of sea level rise and frequent natural hazards. This research highlighted climate change adaptation challenges, which should be considered in any climate change adaptation-related policies and strategies formulation and implementation of climate change adaptation projects and programs. The research has shown the influence of several conversion factors that limit and facilitate individual capabilities. However, climate change is continuous; therefore, recurrent research on climate change is expected to progress human well-being. Hopefully, this research will be a foundation for further research and policy initiatives in Bangladesh; the relevant topic is of significant relevance as it relates to similar situational factors which can be transposed into other relevant settings.