

Is Climate Change Migration an Adjustment to Extreme Weather Events? A Study on the Coastal Areas of Bangladesh

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(Manuscript received 2 September 2021, in final form 31 August 2022)

ABSTRACT: This paper explores the internal migration of fishers from coastal communities of Bangladesh in response to extreme weather events. It also assesses the vulnerabilities to extreme weather events of these coastal areas, in general, and of targeted fishing communities, in particular. This qualitative study employs a combination of methods, semistructured interviews and observations, in two villages located in the eastern part of Kalapara Upazila, Patuakhali district of Bangladesh. The results indicate that the participants of the study are susceptible to the vulnerability of extreme weather events due to their households' socioeconomic and geographical location. This study shows that most people from the fishing communities do not migrate to other places to escape from the vulnerabilities as they have high dependency on fish-related activities. Also, there are various socioeconomic and cultural factors that hinder their migration, including the *Mohajon-Dadon* system, migration costs, lack of skills and resources, and fear of income insecurity. Instead of migrating, they develop their own traditional adaptation mechanisms to ensure their survival. These people remain underrepresented and are not adequately recorded in national or regional migration data.

KEYWORDS: Asia; Coastlines; Extreme events; Climate change; Adaptation; Vulnerability

1. Introduction

Climate change and its impacts command the attention of many experts, including researchers and policy makers worldwide (Warner et al. 2009; Action Aid International 2007; Stern 2007). A subset of this research considers the possible consequences of climate change on internal migration (Piguet et al. 2011; McLeman and Hunter 2010; Tacoli 2009). United Nations reports considering climate-migration dynamics tend to consider the negative impacts of climate change on human societies (Framework Convention on Climate Change 2015). Addressing climate change is a matter of politics and related to another critical issue of adaptation (Stojanov et al. 2014; Giddens 2009). Studies show that sea level rise will lead to the loss of many coastal low-lying lands and small island developing states and contribute to coastal flooding in many parts of the world (Barnett and Campbell 2010; IPCC 2007). Scientists also observe that annual rainfall has increased in many countries of Asia. Evidence shows that South Asia will greatly be influenced by extreme weather events, contributing to severe floods, soil erosion, and crop yield degradation, increasing the risk of food security and hunger (IPCC 2007, 471–473).

As a South Asian country, Bangladesh has also observed severe floods in the recent past, including the most recent

dreadful one, Sidr¹ (IPCC 2007, 472–476), in terms of lives lost and infrastructural damages. Coastal areas face the increasing risks of land erosion and inundation due to climate change and sea level rise. The people living in those coastal and low-lying areas have a low capacity to cope with the future challenges of climate variability. Therefore, some people affected by extreme climate events are assumed to migrate internally to other comparatively safer areas (Black et al. 2011b). A study shows that the potential sea level rising in Bangladesh would be 30–150 cm under high-end warming scenarios. If the country's National Adaptation Plan of Action (NAPA) is achieved, the increase would be 14, 32, and 88 cm for the years 2030, 2050, and 2100, respectively (Karim and Mimura 2008). Sea level rise, a consequence of global climate change, affects the availability and distribution of freshwater in coastal regions. The increase in sea level brings saltwater to the surface. As a result, the areas gradually lose agricultural productivity (Bhuiyan and Dutta 2012). Therefore, life becomes difficult for the inhabitants of the coastal regions of Bangladesh. Some people employ their traditional adaptive mechanisms, while others receive incentives from government organizations (GOs) and nongovernment organizations (NGOs), whereas some migrate to other areas, predominantly urban areas.

Because the term “internal displacement” emanates from humanitarian practice communities and is used for conflict-driven forced movement, experts tend to promote coping

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¹ Sidr is a tropical cyclone that attacked Bangladesh's coastal regions in 2007 and brought unimaginable hazards for the many people living in low-lying coastal areas. It was so devastating that people of the affected area still remember its dreadfulness and even term other cyclones attacking their location later as Sidr.

strategies comparable to fighting against war (Cantor and Apollo 2020). However, many people in instances where internal labor migration is predominant avoid forced displacement and do not leave their places of origin affected by armed conflict (Cantor and Apollo 2020; Devictor et al. 2017). Therefore, this situation makes the term internal displacement vague, as internal displacement also occurs due to many other social changes.

Furthermore, the term “climate migrants” is similar to other terms used for people who move due to environmental changes, such as environmental migrants, environmental refugees, ecological refugees, ecological migrants, and ecomigrants (Piguet 2008; Stojanov et al. 2014). However, the existing literature does not show any clear-cut demarcation among the concepts. For example, Castles (2006) defines environmental displacees as the people who move due to environmental changes, for example, desertification, deforestation, land degradation, water pollution, and floods, and disaster displacees as the people who move due to natural hazards, such as floods, earthquakes, and landslides. Again, Stojanov et al. (2014, p. 517) show that terms like climate migrants, environmental migrants, environmental displacees, disaster displacees are used interchangeably even though environmental migrants and environmental displacees do not have clear-cut distinctions. El-Hinnawi (1985) calls them slow-onset environmental displacees. Even terms of climate change refugees and climate refugees are used repeatedly in the latest Intergovernmental Panel on Climate Change (IPCC) report (IPCC 2014). There are no empirical studies to support IPCC usage (Stojanov et al. 2014, p. 518; Black et al. 2011b). Because climate change is a type of environmental change (Stojanov et al. 2014, p. 516), this paper uses the terms “climate migrants” and “environmental migrants” interchangeably throughout. This study is based on the premise that environmental migration or climate migration brings some opportunities for the migrants (Black et al. 2011b) because migration is viewed as a potential adjustment strategy to cope with and adapt to the climate variabilities and climate change impacts (Islam et al. 2014a, p. 733). It also reflects that vulnerable people can make migration decisions as coping and adaptive strategies.

It is also argued that in the case of internal displacement, some forms of support are needed, such as assistance and protection for the displaced people to safely return to their place of origin. People having family or social networks are more likely to flee internally than others who do not have family or social networks (Cantor and Apollo 2020, p. 649; Saldarriaga and Hua 2019; Ibáñez and Vélez 2008). Like economic migration, internal displacement sometimes takes a permanent form, while sometimes it takes hidden or circular removal to intermediate locations to bring diversity to the affected people’s livelihoods (Cantor and Apollo 2020, p. 649). Moreover, although climate-affected people are forcefully displaced from their places of origin, they are not considered internally displaced people (IDPs) and refugees (Cantor and Apollo 2020; Lee 1996). Instead, they are internal migrants (Piguet et al. 2011) because denoting people as IDPs and refugees requires they be given access to aid (Majidi 2017; Willner-Reid 2016). Since climate-induced migration mostly occurs internally (Piguet et al. 2011) and

since migration decisions, which are dependent on the degree of migrants’ dependency on the environment, include social factors (Kniveton et al. 2008), this study explores why fishers from the coastal areas of Bangladesh do not make internal migration decisions to adjust to extreme weather events as well as how socioeconomic factors affect their migration decision. This broad objective has been split into several specific goals:

- to assess the climate-induced impacts on the study area,
- to explore whether the fishing households affected by the extreme climate events and their impacts migrate internally as a mechanism of their adjustment process to cope with and to adapt to the changing situations,
- to explore the traditional adaptive mechanisms fishing communities develop to cope with and to adapt to the changing environment, and
- to explore why climate-induced internal migration is still underrepresented in fishing communities in the southwestern coastal region of Bangladesh.

2. Literature review

Sea levels are rising, and hurricanes are highly detrimental and so destructive for small islands that the prospect of destruction is more significant than any military attacks (Linkov and Bridges 2011). For example, sea level rises will leave about 187 million people displaced by 2100 (Nicholls et al. 2011). Therefore, people need to take adaptive measures for their survival. Some people take adaptive steps to cope with the situations and live in the climate-affected regions, while others migrate, mostly internally, to other places. However, these decisions or motivations to migrate depend on the conditions of the society. Although people affected by climate change impacts migrate internally (Piguet et al. 2011), it is not the most disadvantaged group that migrates but those who have access to some resources because migration requires financial resources, which the most disadvantaged group cannot afford (Black et al. 2013; Piguet et al. 2011; Skeldon 2003). Therefore, climate migration is sometimes perceived as a medium of adaptation rather than a consequence of failure to climate risks (Tacoli 2009). It means that migration can be both planned and voluntary (Evertsen and van der Geest 2020) and forced. Therefore, opportunities and vulnerabilities of migration cannot be escaped, that is, when migration is planned and voluntary, people who migrate can recover their losses. When forced, migrants experience more vulnerabilities in livelihood and other forms of social security (van der Geest and Warner 2015; Walsham 2010). People in coastal areas are affected by climate-induced risks and disasters. However, many of them cannot move to other places because they lack the ability to do so (Black and Collyer 2014; Black et al. 2013; Piguet et al. 2011) and ecological, physical, economic, and technological factors (Adger et al. 2009) constrain their movements.

Although migration is a complex term and there are many types of irregular migration, change in the environment may act as one of many push factors for migration (Etzold et al. 2014; Joarder and Miller 2013; Penning-Rowsell et al. 2013;

Yasmin and Ahmed 2013). When climate change poses a severe threat to human life and society, many people will become climate refugees (Ahsan et al. 2014; Salaudinn and Ashikuzzaman 2012). After climate disasters, educated and skilled young people, in particular, migrate internally to pursue their livelihoods and explore more opportunities available in urban areas (Malak et al. 2020; Black et al. 2011b). However, the exact reason for which migration, food crisis, and other social problems occur is assumed to be climate change, although there might be other factors responsible for these problems (Alam 2018). Additionally, climate change accelerates the decrease in crop varieties due to monoculture (Alam 2018, p. 200), leading to food insecurity and forcing the internal displacement of the households engaged in the agriculture sector.

Bangladesh is a country of high population density where mobility among people is already high, exacerbated by climate-induced risks and disasters (De Sherbinin et al. 2011; Hugo 2011; Laczko and Aghazarm 2009). Migration decisions also depend on the severity and intensity of extreme weather events, that is, drought, sea level rise, floods, storms, and so on (King et al. 2014; Kothari 2014; De Sherbinin et al. 2011; Shen and Gemenne 2011; McLeman and Hunter 2010; Henry et al. 2004; Findley 1994). Additionally, poor people, the most vulnerable to climate change impacts having the least options and resources to deal with the vulnerability (Kelman et al. 2015, p. 23), cannot even migrate to cities because migration is expensive (Stojanov et al. 2014, p. 511; Black et al. 2011a, p. 448). Therefore, this poor group has to stay in the risk areas and face to multiple threats (Kelman et al. 2015, p. 23) but sometimes develop their traditional adaptation strategies to survive for a longer time. Climate change, which is one of many creeping environmental changes (Kelman et al. 2015, p. 25) and a driver of natural hazards (Stojanov et al. 2014, p. 510), has both direct and indirect impacts on the migration pattern of Bangladesh based on some particular factors in the country, such as sea level rise, damage to crops, fisheries and livelihoods, and conflicts over health and education services (Brzoska and Fröhlich 2016; Felli and Castree 2012; Black et al. 2011a,b; Hugo 2011; Hartmann 2010).

While it is a typical case in Bangladesh to migrate to city areas as a coping mechanism to flooding (Black et al. 2011a, p. 448), climate experts argue that people in Bangladesh affected by various climate change impacts use migration to adapt to climate change effects (Stojanov et al. 2016, p. 1) because migration provides them an opportunity of income diversity and resilience building (Black et al. 2011a, p. 448). Furthermore, people affected by climate events, such as droughts and floods, employ various indigenous strategies to respond to lack, such as water storage, crop varieties, livestock selection, and migration in Bangladesh (Ahmed et al. 2019). So, people affected by climate-induced disasters and extreme events employ migration as one of many coping or adaptive mechanisms (Islam et al. 2014a; Barnett and O'Neill 2012; Kuruppu and Liverman 2011; Tacoli 2009). In most cases, these people migrate internally from the affected places to other safe areas in the country.

However, climate change-induced migration happens not only due to a single reason but also because of multiple factors, including local economic, social, and political situations (Stojanov et al. 2014, p. 510). Additionally, Stojanov et al. (2016) argue that livelihoods and economic opportunities are the main drivers of migration despite other factors that drive people in Bangladesh to make migration decisions. Although there is no consensus among the social science researchers, policy makers, lawyers, and academics on the definition of climate migration (Islam 2016a; Stojanov et al. 2016), migration is the best rational choice of adaptation for the people in Bangladesh affected by climate change hazards and disasters (Islam 2016a, p. 59; Islam et al. 2014a, p. 734). Thus, drawing on Stojanov et al. (2016, p. 4), I will apply the term of internally displaced climate migrants in this article to explore the climate change impacts and to ascertain whether people move to other places near and far as an adjustment to climate change impacts.

To reiterate, Felli and Castree (2012), Guan and McElroy (2012), Hugo (2011), and Stojanov et al. (2016) argue that climate change has been considered as one of the most significant factors affecting migration in Bangladesh because climate change affects and will affect the country greatly (Etzold et al. 2014; IPCC 2014; Uddin et al. 2014; Pender 2008). As a result, migration becomes an adaptation mechanism to climate change impacts for the people who continuously suffer from cyclones, floods, storms, and so on (Black et al. 2011a). Meanwhile, it is evident that there are detailed secondary sources on climate change, its impacts, and migration; however, very few of them consider the perspective of local farmers (Mardy et al. 2018; Alam 2015), who are the real actors on the frontline against climate-induced disasters. Similarly, migration in the fishing communities is not fully researched in Bangladesh (Islam et al. 2014a), although migration provides alternative livelihoods (Ahmed et al. 2019, p. 56).

Although the Bangladeshi government has adopted both Climate Change Strategy and Action Plan, which include six different adaptation measures to combat climate change impacts such as food security, social protection, and health (Ministry of Environment and Forests 2009), and the National Plan for Disaster Management, which incorporates warning systems before cyclones and floods, construction of special houses with high ground floor, and coastal dams, embankments, and polders (Disaster Management Bureau 2010), people especially living in coastal fishing communities migrate from their homes as a direct response to the climate-induced cyclones and floods (Stojanov et al. 2016, p. 3; Islam et al. 2014a). Again, Felli and Castree (2012), Guan and McElroy (2012), Hugo (2011), and Stojanov et al. (2016) argue that climate change has been considered as one of the most significant factors affecting migration in Bangladesh because climate change affects and will affect the country greatly (Etzold et al. 2014; IPCC 2014; Uddin et al. 2014; Pender 2008). As a result, migration becomes an adaptation mechanism to climate change impacts for the people who continuously suffer from cyclones, floods, storms, and so on (Black et al. 2011a). Since environmental changes happen under climate change conditions, climate migrants and environmental

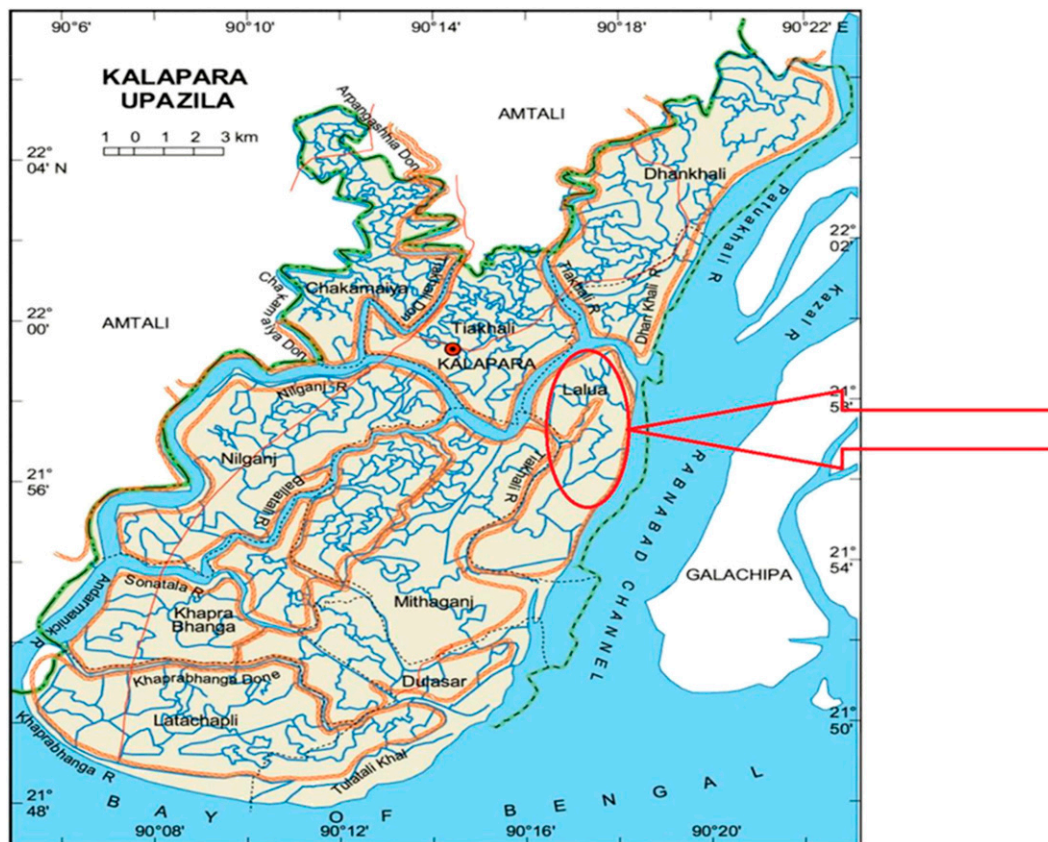


FIG. 1. Study areas (Islam 2016b).

migrants are used interchangeably (Stojanov et al. 2016, p. 3). And this type of migration has been observed both within and across the country (Islam 2016a, 58–59).

On the one hand, studies show that people in the nonagricultural sector are more likely to migrate due to climate disasters because they lack farm ownership and have fewer connections with the rural community (Ishtiaque and Ullah 2013; Mallick and Vogt 2012; Swain 1996). Some researchers employed lifetime memory measures while analyzing migration due to environmental disasters (Bernzen et al. 2019, p. 8). In contrast, some other researchers consider a 15-yr period (Gray and Mueller 2012), while others used vital statistics (Chen et al. 2017). All these research studies have a common feature of findings that a tiny portion of internal migration in the coastal area of Bangladesh, where people, particularly men, are engaged in nonagricultural jobs (Bernzen et al. 2019, p. 8).

Furthermore, on the one hand, Stojanov et al. (2016) claim that there is a longstanding debate about whether migration is an adaptation mechanism to climate change impacts but no empirical evidence to support (Islam et al. 2014a, p. 734). On the other hand, Stojanov et al. (2016) demand further research that incorporates the people affected by climate-induced risks and hazards. My present study contributes to the existing scholarship on climate change impacts, risks and threats, climate-induced migration, and adaptation in coastal areas of Bangladesh.

3. Method

This study is qualitative, and the study design is descriptive-exploratory. Because qualitative researchers employ personal experiences while making the qualitative inquiry (Creswell 2014; Denzin and Lincoln 1998), I studied participants in natural social settings for a better understanding of the topics under study (Creswell 2014; Neuman 2011; Somekh and Lewin 2005).

a. Study areas

This research was conducted in the eastern part of Kalapara Upazila of Patuakhali district, a southwestern district of Bangladesh. The study purposively selected two villages of Lalua Union located in the eastern part of Kalapara Upazila of Patuakhali district for two reasons: they are highly vulnerable to floods and cyclones because of their current highest poverty rates (Government of Bangladesh 2008, p. xviii) and they were badly affected by Cyclone Sidr in 2007 (Government of Bangladesh 2008; Office for the Coordination of Humanitarian Affairs 2007). In addition, because of the low-lying coastal location, the areas and the people face the first hit of extreme weather events, such as cyclones, floods, and sea level rise. These two villages are situated between 21°48' and 22°5'N and between 90°5' and 9°20'E (see Fig. 1).

b. Population sampling and data collection

Participants were recruited through purposive sampling based on three criteria. First, they faced the first hit of the disasters. Second, they had the experience of Cyclone Sidr. Third, they were mostly dependent on nature for their livelihoods. I did not consider the people who had already migrated because it was difficult to reach them and there was no record of their movement. As a result of the sampling, I interviewed 56 and 77 household heads/key informants from Naowapara and Charipara villages, respectively, until the data saturation was achieved. While doing face-to-face interviews with 133 participants with a standardized open-ended questionnaire (Patton 2002, 344–346), I also used observation, sometimes called field research or ethnography (Neuman 2006), and took notes that were then used to analyze the data. Alongside the open-ended questionnaire, I also designed an interview guide to ensure the flexibility for the participants to explore in-depth understanding of their experiences with the floods, cyclones, and so on, and the story of their adaptation mechanisms, which I could not observe (Sanderson and Galway 2021, p. 3; Patton 2002, p. 341). While recording some interviews, with prior permission, I took observational notes and reflective notes for all other interviews that I have incorporated into the transcription of the interviews and initial description of the findings (Sanderson and Galway 2021).

c. Data analysis

After transcribing the recorded interview, field information was coded into different themes and subthemes for final outputs. Qualitative analysis entails interpretative analysis for a more critical and deeper meaning of field data because interpretative analysis goes beyond the descriptive analysis (Sanderson and Galway 2021; Braun and Clarke 2013; Denzin and Lincoln 1998). In this regard, after transcribing the recorded interview, the field data were analyzed applying thematic analysis that focuses on the experience and sense of the participants about the real world and on the researcher's observation, knowledge, and epistemology (Braun and Clarke 2013, p. 175).

4. Findings

The thematic analysis covers the impacts of climate change on the study area, the traditional mechanisms used by the affected people for adaptation, the decisions made for internal migration as an adjustment strategy, and the reasons for which internal migrants are underreported. Nearly half of the interviewed research participants are female (60 participants). This situation does not necessarily mean that these female participants hold the headship of the households. Instead, it shows that male members, including household heads, remain outside of the home to secure an income for the family. Male members of the households spend most of the time in the day, sometimes at night, in the river/sea to catch fish, which is also the only means of livelihood for the people living in the study villages. The participation of the female respondents reflects the analysis free from gender biases.

In the first theme, we see that people have been experiencing the severe impacts of climate change. All respondents mention that they have been experiencing floods and cyclones frequently in the last few years. An elderly respondent opines in this way:

I did not see such a type of hostile behavior in the environment before in my entire lifetime. Every after few days, our homesteads and areas are inundated by seawater. Floods and cyclones are widespread for us (Islam 2016b).

The respondents particularly cite the severe devastations of Sidr, which damages their means of subsistence, roads and culverts, schools, mosques, and so on. The interviewees also mention that after Sidr, people lost everything and tried to obtain their livelihoods from other sources, sometimes doing illegal tasks such as theft and ransacking. A respondent cites the situation in this way:

We lost everything and became poor and now earn our subsistence hard. Sometimes we cannot manage meals three times daily and have to starve. Our subsistence depends on the river fishing. If we get expected fish, we eat; otherwise, we starve (Islam 2016b).

This statement shows that climate change affects respondents directly or indirectly by bringing changes in the physical and social environments of the villages. In addition, the researcher's conversation with local people and union representatives shows that before Cyclone Sidr in 2007, people had been facing disasters like drought, excessive rainfall, earthquake, cyclone, and flood. But Sidr damaged their capacity, income sources, and the cross belt dam of the areas. Consequently, the disasters are very devastating to them. However, participants are not aware of the changes and do not even know the causes of climate change as they have a low level of education. Interviewees generally are engaged in fishing, mostly where few of them own fishing materials—boats, nets, and so on—but some work as day laborers in the fishing sector. The study area goes under flood water frequently. Especially in the rainy season, the whole area remains underwater for a few days. Interviewees argue that they cannot produce any cereals, especially after the Sidr cyclone attack in 2007. Due to landslides, most participants lost their cultivable lands and homesteads and eventually engaged in different activities as daily laborers in fishing activities or agriculture (Islam 2016b).

On one side, agricultural lands and homesteads are sinking into the river, while the destructive effects of nature make earning their subsistence more difficult. All the participants argue that the rainy season is a kind of anxiety and panic for the people of the locality because the rainy season is the peak time of the year when disasters like rising sea levels, floods, and cyclones happen more frequently and intensely. They claim that farmers cannot harvest during this season while day laborers do not get work in the agricultural fields, and fishers cannot go to the river or sea to catch fish because of the antagonistic behavior of nature. Interviews show that though fishing is the primary means of livelihood for the people in the study area, most of the participants do not have the

necessary fishing equipment like boats, nets, and capital. Therefore, they obtain a loan from money lenders who are called *Mohajon*² locally. There is a particular system of loans obtained from Mohajon for the fishing boat in the study area, which is called *Dadon*.³ The worst side of this loan system is that if the fishers who took Dadon from Mohajon sell their fish to other people or other Mohajon even, the fishers receive the severest punishment, including physical torture and seizing of their property. In addition, sometimes Mohajon takes back their fishing boat given to fishers as Dadon in the middle of the fishing season. Keeping severe punishment in mind, participant fishers do not risk and sell their fish to the respective Mohajon. Most of the respondents claim that because Mohajon has a lot of money, he has a good connection with local politicians, which also makes him more powerful locally. Almost all of the fishers claim, "Our lives are tied to the wills of Mohajon for the whole fishing season. So, we cannot move to any other places" (Islam 2016b).

So, the respondents' poor economic conditions and specific social conditions, such as Dadon system, make them bound to continue their livelihoods in the study areas and struggle to survive against extreme climate events. My observation also shows that people familiar with Mohajon in the study areas provide donations to the local politicians to keep a political network that allows them to exercise extra power over the poor fishers. Therefore, the respondents cannot leave their homes without paying the debt. The interviewees express that flood is a widespread disaster in their areas. They have also been suffering from various water-borne conditions like diarrhea and allergies, including some chronic diseases due to seawater coming to their homesteads even during the usual tide of the river, in addition to the flood water, which remains several days due to lack of proper drainage system. They also claim that their children cannot go to school, particularly during the rainy season, because homesteads and roads remain under the water due to seawater intrusion. One interviewee expresses the situation in this way:

The road is like a death trap. It is broken everywhere due to the heavy flow of seawater. The local people made some bamboo-made culverts to cross those broken parts. Where we, the matured people, cross the canal and culverts with great difficulty, how can the little children cross them? Last year, a seven-year-old girl drowned in the water while going to school (Islam 2016b).

My observation confirms that respondents do not want to send their children to school because of the bad condition of the roads because I find the boys helping their fathers in fishing activities and girls doing the household chores. Interviewees

² *Mohajon* is a term used locally to refer to people who lend money to other people at a very high rate. These people (Mohajon) sometimes beat the money receivers when they cannot repay the installment in a timely manner. There are many cases of their victims in the rural areas of Bangladesh (Islam 2016b).

³ *Dadon* is a ubiquitous term among the people engaged in fishing activities. The money that Mohajon lends to other needy fishers is called Dadon. These fishers receive cash on the eve of fish catching seasons and promise that at the end of seasons, they will repay the money to the Mohajon (Islam 2016b).

were asked about the types of crops that they have been producing for the last three consecutive years. All respondents argue that they have been producing only "Amon" paddy for the last seven years after Cyclone Sidr. Cyclone Sidr destroyed the dams and embankments; swept away crops, poultry, and livestock; and washed away their homesteads. As a result, saline water from the sea enters the surface very quickly during every tidal time. Among the participants, a farmer describes the situation in the following way:

Last two years I did not harvest any crops since the land remained under flood water which also mounted by excessive rainfall. This year my Amon paddy is also damaged by uncertain flood water (Islam 2016b).

Thus, the respondents engaged in fishing and farming became dependent on Mohajon to rescue themselves immediately after the disasters. It shows that Dadon system is a coping strategy or sometimes adaptation strategy for the fishers in the coastal areas. Nevertheless, all the respondents agree that they cannot migrate to other places, searching for a better and safer environment to escape these reverse conditions.

Some structural defenses include dams, embankments, and cyclone shelters. However, the interviewees argue that Sidr damaged the cross dam, which is still broken. Therefore, they mention that seawater and flood water enter the surface and directly hit their lands, crops, homesteads, roads, and other infrastructures of the area. As a result, because of its low-lying location, the study area gets inundated even during the usual tide of the river. This research also shows that there is only a cyclone shelter, which is not enough for the inhabitants of the study areas. The interviewees claim that most people stay at their homes because the areas' infrastructures and cyclone shelters are not pleasant for them.

Nevertheless, people who take shelter in the only cyclone shelter cannot go downstairs to collect drinking water because the tube wells also go underwater during floods. Since there are no separate rooms for women and girls in the shelter, most respondents affirm that women and girls do not want to go to cyclone shelters in most cases and instead stay at home and face the vulnerabilities of the disasters. In addition, women and girls cannot decide alone to migrate to other areas. Therefore, the death rate among them is high during the natural calamities in the area.

Furthermore, all the participants claim that they have been experiencing floods throughout the year for the last seven years after Cyclone Sidr. Interviewees state that surge is one of the significant problems in their areas. It occurs so frequently that it becomes part and parcel of their lives. Most of the interviewees claim that although it is true that people lose their belongings and do not have any means to manage their livelihood, they rarely migrate to other places because the current social world is known to them. They also claim that although they have been facing climate-induced vulnerabilities, they cannot go to different places because their livelihood depends mostly on fishing. They do not have enough money to shift to another location for a safer environment. However, they mention that some of their relatives and neighbors

migrated to other areas, particularly the cities of Patuakhali and Dhaka because they have relatives there who ease their mobility to the new places. One respondent argues:

I do not have cash money to bear the transportation costs to Patuakhali city. After paying the interest of Dadon every week, I have very small amount to bring bread for my household (Islam 2016b).

This statement denotes the actual scenario of the fishers of the study areas. The interviewees argue that the people who migrate due to climate disasters do not go to Dhaka because they do not have an education and do not have any expertise to obtain jobs there. They mention that a big city needs skills that most people in their villages do not have. Instead, they choose some other places where they can work as day laborers to earn their livelihoods. All the participants claim that they do not know how many people are migrating, how many of them are returning, and where they are going. Therefore, the people who migrate remain unreported or underreported.

Additionally, almost all participants claim that even if migration occurs, most people prefer temporarily a nearer destination, Kalapara Upazila center, which is familiar to them. They mention that, in times of need, they will get help from people they are familiar with. The respondents argue that people do not want to migrate from their familiar place because a new place means new people, a new environment, a new neighborhood, and new challenges. Furthermore, some participants mentioned that people of their villages, including themselves, do not want to leave the areas since they are familiar to them and they have great affection for the local inhabitants and places. In addition, they argue that at least they can take a loan from the Mohajon because they know him.

Furthermore, soil erosion has become a very ordinary matter due to continuous flooding. The respondents claim that some people lost everything due to landslides and soil erosion and now live beside the valley of the broken dam. These people cannot migrate to other places because they think there is no place where they can go and build their houses. Therefore, from the explanation mentioned earlier, it can be explored that respondents of the study villages do not have the financial ability to migrate from “the Hell,” in their words, to a safer place. Interviewees argue that cyclones and frequent floods bring seawater to the surface, and as a result, houses, ponds, and lands are flooded by saltwater. Thus, farmers cannot cultivate their lands, day laborers do not have work, and fishers cannot continue fishing because of cyclones and stormy weather. Therefore, some people do not have any alternative other than migrating to other nearest places because of the lack of income sources. Therefore, internal migration is an alternative adaptation strategy for some people, but not for the majority of people living in the coastal areas of Bangladesh.

Nevertheless, because almost all respondents argue that they manage their livelihoods from the nearby river or sea, they cannot migrate to other places because they fear of losing their fishing occupation. These people think that they do not pay anything to nature for their livelihoods. Therefore, they openly accept their misery as an unavoidable part of their life, which is evident from a respondent’s statement:

The arrogant cow which gives milk is still good even if it kicks the owner. Since our income is related to the river and sea, we have to live here even if we have to bear more vulnerabilities than we face now (Islam 2016b).

Interviewees claim that people of their villages have the tendency not to move to an unknown place where they have to compete with local people to earn their subsistence. Moreover, respondents state that they do not have cash capital to manage the expenses of migration, on the one hand. On the other hand, they do not have any relatives at the destination places who can ease their arrival and shelter them for the first few days. This justification shows the respondents of the study lack both economic capital and social capital to move from the vulnerable areas to a safer place where they can diversify their incomes.

The vulnerabilities of climate-induced disasters depend on how the people are alert and capable of taking protective and adaptive mechanisms beforehand, during, and after every disaster. The respondents claim that Bangladesh Red Crescent Society (BDRCS) warns the people before any cyclone or flood hits their areas. During the dry season, BDRCS and some NGOs also arrange yard meetings to train people, particularly the women and girls who are the most vulnerable to disasters. They also claim that BDRCS and some NGOs organize workshops and distribute leaflets, life jackets, tree plants, and so on, to make people aware of reducing the risks and hazards by taking coping and adaptive mechanisms. The interviewees also mention that NGOs sometimes implement capacity-building projects through alternative income-generating activities like poultry, livestock, and cash loan distribution and food-for-work programs to increase their resilience to climate change impacts. Interviews show that BDRCS and NGOs also advise people to move to cyclone shelters when cyclones and floods hit and to build their homesteads and toilets high, plant more saline-friendly trees like coconut trees, date trees, and palm trees around their homesteads to reduce risks and vulnerabilities. These NGOs sometimes use proverbs or slogans so that the people can internalize the vulnerability of climate change impacts. A female respondent states a slogan frequently used in the Bengali language by the NGOs in this way: “Shokto vite uncho ghor, gach-pala thekai jhor (Strong foundation of homesteads, high elevated home and trees prevent storm)” (Islam 2016b).

This respondent argues that NGOs always suggest building homesteads strong and high so they cannot be inundated quickly during seawater intrusion. All the participants mention that they keep valuable things and documents underground, send their livestock and poultry to the specific high ground, tie their homestead with big trees, put big logs around the homesteads, and so on, immediately before the cyclone and flood hit their areas. In addition, participants, particularly women and girls, plant papaya trees, banana trees, and other herbs and grass around the homesteads so that the mud of the homesteads does not get washed away by the seawater or flood water. All the interviewees mention that after having information from NGOs, they keep some dry food, first aid essentials, and so on, before the rainy seasons start and agree

that all these mechanisms help reduce risks to some extent. They also mention that now all women members of their areas keep ready *Salwar-kameez*⁴ to wear during the disaster time because women in the village areas generally wear *Saree*, which is responsible for the death of many women during the cyclones, floods, and other disasters. They argue that people cannot reach the cyclone shelters or other higher places during the storm wind and the floods because *Saree* absorbs more water. Thus, women's death toll is higher than that of their male counterparts because maintaining *Saree* during the stormy weather and walking through the floodwater is difficult. However, they claim that these traditional strategies are effective until a certain threshold. Still, when seawater flows strong, these mechanisms do not work, and consequently, their homesteads and other belongings get washed away by seawater. Nevertheless, the respondents state that they struggle with the traditional adaptive mechanisms and do not make internal migration decisions.

Therefore, from the interview results and field observations, most respondents do not migrate to other places for several significant reasons. First, although all of the respondents live in such a poor condition, they cannot afford the expenditure of migration. Second, most of the respondents and their relatives are dependent on fishing from rivers and the sea for their livelihood. Third, they fear not being able to get work in new places, particularly in cities, because they do not have other skills except fishing. Fourth, they do not want to leave familiar places as long as they can manage at least daily work to maintain their livelihood, or take loans from the money lenders, or receive from the neighbors who are also known to them. Fifth, their life is closely tied to the *Dadon* system and the wills of the *Mohajon* of the area. Sixth, new places are composed of a new environment, new people, and so on. Therefore, it would be more difficult for them to cope with the new environment and new people because they lack the social and economic capitals to adapt to the current situations. Consequently, they cannot make internal migration decisions as coping strategies or adaptation mechanisms. Since the area under study is a coastal land located in the country's danger zone, it is greatly affected by natural calamities, such as cyclones, floods, and excessive rainfall. All the participants mention that they employ their traditional adaptive mechanisms or mechanisms they learn through various programs organized by many NGOs working in the area. They try to construct their homesteads high and robustly and plant more trees to survive in saline water. They also grow grass and herbs around the homesteads, which is also helpful in protecting the homesteads from floods.

The researcher's observation shows that the interviewees and the other members of the study areas do not get

demoralized after natural disasters occur. The participants believe that because their livelihoods depend on the fishing activities related to nature, they do their best to cope with and adapt to sea level rise, floods, cyclones, and so on. They also claim that they start struggling with what the disasters left for them as they do not have any other choices. In doing so, when affected people lose their livelihoods, they sometimes take loans from NGOs and mostly from money lenders with high interest rates as a coping mechanism to lessen the immediate risks (Hussain et al. 2021). The ultimate result is that these people constantly find themselves in the vicious circle of debt and poverty. They do not have alternative income sources to help them recover from critical conditions.

Furthermore, the interviewees do not know the reasons for those disasters. Rather, they only know that tragedies are commonplace in their times. This lack of knowledge about the reasons for the disasters shows the low educational status of the people interviewed. This study reports that people in the study area can now understand the possibility of destructive characteristics of cyclones and floods by observing the effects that appeared to them. They have been experiencing storms and floods continuously, particularly after the *Sidr* cyclone. Their experience shapes their life, outlook, and view of the possible impacts of and adaptive measures to those disasters. Local adaptive methods are prevalent among the people who rarely wait for and depend on other adaptive strategies provided by the government or NGOs.

5. Discussion

Climate change creates significant problems for humanity in the affected areas (IPCC 2014). Bangladesh is a highly populated country with a high migration rate that is and will continue to be boosted by climate-induced risks and disasters (Etzold et al. 2014; IPCC 2014; Uddin et al. 2014; De Sherbinin et al. 2011; Hugo 2011; Laczko and Aghazarm 2009; Pender 2008). The country claims to be disaster-prone because of floods, heavy downpours, erosions, cyclones, and so on (Government of Bangladesh 2008). Therefore, climate change is a great concern for a low-lying country like Bangladesh (IPCC 2014). Therefore, climate change is a great concern for a low-lying country like Bangladesh (IPCC 2014). The rainy season is supposed to be a blessing as it brings much rainfall, which makes the trees and leaves healthy, fills the water reservoirs with water, and supports farmers in land cultivation. Instead, the rainy season becomes a curse for the area and its people because of climate change and other interactive factors in the study area. Climate change impacts natural hazards, brings many changes in the affected areas, and makes them vulnerable (Kelman et al. 2015; Stojanov et al. 2014). This study explores that environmental disasters such as sea level rise, floods, and cyclones damage crops, homesteads, poultry, livestock, roads, and fishing boats and nets and destroy people's working capacity. The affected people also suffer from various water-borne diseases, which sometimes cause death. From the statement of the participants, it is clear that when a cyclone leaves or a flood

⁴ It is a dress code used by girls in Bangladesh. This dress is more comfortable, particularly during extreme weather events such as storms and floods, because it holds less water. NGO workers advised the respondents to keep ready at least one pair of *Salwar-kameez* as a coping and adaptive mechanism for each household woman who wears *Saree* to reduce the risks and hazards, including death (Islam 2016b).

recedes, the areas look like a valley of death, a complete hell (Islam 2016b, p. 221).

However, the respondents are not aware of the causes and consequences of the adverse impacts of climate change. My observation shows that the climate change issue and its dreadful consequences are not included in the national curriculum yet. Additionally, the participants have limited resources, limited political participation, weak physical structure, lack of skills and income diversity, and so on, to cope with and adapt to the changing environment. As a result, they cannot take proper and timely adaptive mechanisms to reduce risks. This result echoes a previous study that argues that adaptation at the local level depends on the community's infrastructure, household structure, power relations, political influence, social capital, and knowledge (Islam et al. 2014b).

The present research shows that although poverty levels have increased due to continuous cyclones and floods, internal migration pattern changes are not manifested largely. People come forward to help each other in times of emergency, which they will not find in a new place if they migrate. Therefore, most of the respondents do not migrate to other sites. Consequently, we see a different scenario of migration in the study area. Only a limited number of climate-affected people migrate to other places where they have relatives. So, in the last 10 years, only a small number of the households migrated internally to the areas where they have relatives and security of income and shelter. However, they are not even treated as environmental refugees (Bates 2002) or climate refugees (Ahsan et al. 2014; Salauddin and Ashikuzzaman 2012), or environmental migrants or climate migrants (Stojanov et al. 2014; Piguet 2008), or even as climate change refugees or climate refugees (IPCC 2014); rather, they are treated as economic migrants. Therefore, they do not have access to many services. So, they have a challenge of identity crisis (Islam 2016a) in their own country of citizenship. This situation can be connected to the political ecology approach that sees how governance and power are related to the movement of people, to their presence or absence in the context of political, economic, cultural, and ecological effects (Bryant 2015). Climate change, which is considered a driver of natural hazards, affects the migration pattern of the affected areas. Because climate-induced migration mainly occurs internally (Piguet et al. 2011), the climate-affected people's internal migration is connected to many sociopolitical factors, such as poverty, food crises, and social inequity (Stojanov et al. 2014, p. 510). The results of the study affirm the multiple forms of power that shape the conflicts over natural resources (Mollett 2015) covered by the political ecology approach, that is, the power relationship between Mohajon and fishers and between internal climate migrants and people from destinations.

The current study shows that internal migration due to extreme climate events is not considered a medium of adaptation in the fishing communities living in the coastal areas of Bangladesh. Again, even though many vulnerable people have relatives in the destination places or migrate temporarily remains underreported because there is no record of how many people migrate and where they move from the study areas. Although internal displacement is regarded as an

outcome of conflict and sometimes should be regarded as a social process where it merges with other forms of human mobility, that is, internal migration, it is not a subspecies of internal labor migrants or protorefugees (Cantor and Apollo 2020, p. 660). Moreover, a study conducted in Brazil shows that climate change impacts the spatial distribution and livelihoods of the affected area, and almost 0.9 million more people migrate interregionally because of low migration costs (Oliveira and Pereda 2020). However, the results of this study show that people in the study area are highly vulnerable to climate change impacts and extreme climate events. Still, they cannot move to comparatively safer places as they cannot afford the movement and placement costs. The present study explores that the participants want to live in their known place, their birthplace, where they can at least take a loan from the Mohajon in an emergency.

Moreover, Stojanov et al. (2016, 10–11) consider migration not as an adaptation strategy but as an alternative strategy or as an adjustment strategy. However, my study results provide a slightly different scholarship that people in coastal areas of Bangladesh affected by climate change-induced risks and hazards consider internal migration neither as an adaptation mechanism nor as an alternative or adjustment mechanism because they do not migrate internally; rather, they continue living in the climate change affected areas and develop their own mechanism to cope with and to adapt to the changing environment. In addition to their traditional coping and adaptive mechanisms, the respondents generally receive information from BDRCS and other NGOs working for capacity building and raising awareness among the people. They plant particular trees and herbs around the homesteads to protect them from the first hit of the seawater, build their house high, keep a separate and elevated mud stove, change their dress codes, and so on. The respondents have a better opportunity build their homesteads' floors and pillars with cement to protect them from seawater. However, when the storm begins, and floodwater flows strong, all their efforts go in vain, and nothing can save their homesteads and other belongings such as fishing materials, poultry, and so on. In that case, they repair their homesteads, start fighting with nature for earning their subsistence and continue living while facing the vulnerabilities of extreme weather events.

Unlike other studies (Haque et al. 2013; Sanderson 2012; Mutton and Haque 2004; Rased and Mallik 1995) that claim that migration in Bangladesh is forced migration and is used to adapt to many situations, including climate change impacts, the present study shows that internal migration cannot occur for various socioeconomic reasons. These include the Mohajon-fishing relationship, known environment, lack of skills, social networks in origin, fear of income insecurity at the destination, and so on. This result echoes a previous study that claims that although climate change impacts weather and natural hazards that boost the displacement flow, internal migration flow depends on various social causes (Oliver-Smith 2012).

Also, when people lose their belongings such as homesteads, agricultural lands, and fishing materials, or when they cannot produce any crops due to frequent flooding, some migrate to other cities. However, there is no social safety net to

cover them in the destination places, which must develop a migrant registration system to provide the internal migrants with essential public services, employment opportunities, and so on (Schoening 2020). Therefore, they struggle with identity crises, which supports a previous study (Islam 2016a). However, sometimes the relocated households do not find the destination places as friendly as they did assume before. So, even if they migrate, they return to their place of origin. My conversation with the local representatives supports that there is no official record of how many people migrate from and how many return to the areas. The movement of these people remains either unreported or underreported. Therefore, internal migration is not considered an adaptation mechanism for the fishing communities in the coastal areas of Bangladesh.

In addition, the limited political participation of these people decreases their resilience to the hazards of climate variability. This result supports the idea of Beck (1992), who argues that environmental problems do not refer only to the difficulties of surroundings. Instead, they are social problems related to the people, their living conditions and history, and their relationship with social, cultural, and political institutions.

However, the present study argues that some social and economic factors hinder the climate affected people from migrating internally in the Bangladesh coastal region despite many other studies claiming that immediate impacts of extreme climate events lead to internal migration (Stojanov et al. 2016; Felli and Castree 2012; Guan and McElroy 2012; Hugo 2011). In contrast, long-term effects of climate change lead to permanent or lifetime migration as people use migration as a coping strategy in the climate-affected areas (Baez et al. 2017; Partridge et al. 2017; Drabo and Mbaye 2014; Marchiori et al. 2012). Meanwhile, the present study depicts that the respondents live in rural coastal regions and are primarily engaged in fishing activities with some people involved in agriculture. Most of them do not migrate to other places as a part of the adaptation mechanism. It shows a very different scenario from a previous study that argues that internal migration is used as an adaptation strategy in rural communities of western Mongolia where climate affected people, mostly involved in pastoral livestock, horticulture, and crop production, migrate to urban areas (Schoening 2020, p. 22). This comparative statement shows that internal migration as a coping or adaptation mechanism is context specific (Haq et al. 2021) because some people migrate under certain climate changes while others do not.

Moreover, there is no consensus around understanding the relationship between climate change and human mobility (Stojanov et al. 2016). While environmental refugees leave their traditional living places due to environmental disruption, refugees are those, defined by the United Nations Convention on Refugees 1951, who leave their conventional living places and migrate because of fear of prosecution (Islam 2016a, 65–66; Wilkinson et al. 2016, p. 1). In addition, people who are displaced due to climate change are regarded mistakenly as climate change refugees (Wilkinson et al. 2016, p. 2). Therefore, considering both the intensive and extensive risks of climate change, Warner et al. (2013) classified human mobility into three types such as migration, displacement, and

planned relocation (Warner et al. 2013) where migration and planned relocations are voluntary movements, and displacement is forced movement of the people within the national borders due to intensive climate risks (Warner et al. 2013, p. 2). Climate-driven displacement is temporary and covers short distances and affected people. In most cases, they return to their place of origin after staying a short period in safer areas (Bilak et al. 2016; Wilkinson et al. 2016; Brickle and Thomas 2014).

Although the people who live in poverty are more likely to migrate internally within Bangladesh (Hassani-Mahmooui and Parris 2012), people from the fishing communities do not migrate internally to cope with and adapt to the impacts of extreme weather events. Again, although climate-driven internal migration in the country, unlike other forms of internal migration, does not lead to an increase in the number of protests arising as a result of tensions between the migrants and existing inhabitants (Petrova 2021), the people of the fishing communities in the coastal region of Bangladesh do not prefer internal migration as their adjustment strategy. Instead, they prefer to continue living in their original place and to develop their traditional adaptation mechanisms for survival.

6. Conclusions

Bangladesh has low-lying coastal areas that are highly vulnerable to climate change. In 2007, the two villages Charipara and Naowapara experienced the severe blow of climate change. The fishing communities from these villages cannot forget the bitter memories of the Sidr cyclone, but most of them do not migrate to other places to escape from the vulnerabilities of climate change. Because of economic, social, and cultural reasons, they choose to stay and employ traditional mechanisms and efforts to survive and cope with and adapt to the adverse impacts of climate change. For instance, people in the study areas plant particular trees and herbs around the homesteads, make their homesteads comparatively higher from the ground, change their dress code, and receive training. In this regard, local NGOs, particularly BDRCS, play a significant role in training the participants, especially the communities' women, who are considered to be active agents in traditional adaptive mechanisms.

Nevertheless, only very few people who can afford migration costs, have income security, and have relatives in destinations migrate internally. However, because they mostly go to their relatives and engage in the informal sector in the destination, they are not regarded as climate-induced internal migrants. Their number is not recorded regionally or nationally. Therefore, such a type of climate-induced internal migration of people from fishing communities remains underrepresented.

From this study, it is clear that people from fishing communities do not have any income source except from the fishing activities that ensure their subsistence. As a result, they live in poverty and cannot afford the migration and placement costs in the destination areas. Another reason is the low level of education among the participants. They lack the ability to think of long-term resilience to climate change impacts and their strong attachment to their birthplace enables them to decide

emotionally rather than pragmatically. Furthermore, this research indicates that the villages in this study are composed of fishermen whose “hands are tied” to Mohajons, who give them Dadon with high interest and strict conditions. Therefore, the respondents cannot come out of this cycle of Dadon and decide to migrate to some other safer places even though they have been experiencing the vulnerabilities of floods, sea level rise, cyclones, soil erosion, inter alia. Although the area is situated in the danger zone of natural disasters, the people’s adversities mainly depend on prior warning measures, coping strategies taken by government/NGOs, and by the people of the study area during the extreme weather events.

Therefore, by following Haq et al. (2021), who suggested understanding the local knowledge and local adaptation mechanism to develop long-term adjustment strategies against the adverse impacts of climate change, this study concludes that climate-induced internal migration occurs only when other local socioeconomic and cultural, and political aspects create favorable conditions for the affected people. Further research must be conducted covering the local aspects in Bangladesh’s coastal areas, which influence the people to make climate-induced internal migration. New policies must be formulated to count all types of mobility of climate-affected people and record them accordingly.

This research contributes to the scholarship on climate-induced migration by providing evidence from existing migration studies and showing how a particular community can survive for years without using internal migration as an adaptation mechanism. This study offers a context-specific scholarship of traditional mechanisms that play a role in coping with and adapting to the adverse effects of climate change against the existing scholarship on climate-induced internal migration. The findings from this research can also help inform the policy design to incorporate the internally displaced people due to extreme climate events and their impacts on the social safety net so that climate-induced migrants can diversify their livelihoods and increase their resilience to climate change impacts in the future. In addition to the formulation of local and national policies, the participation of local people should be ensured to see the successful implementation of policies. In this regard, government and NGOs can design capacity-building projects for the fishing communities as they do not prefer migration as a medium of adaptation.

Acknowledgments. This paper has been developed from the Ph.D. dissertation of the author. I thank my mentor and Ph.D. supervisor Prof. Dr. Gülay Arkan, faculty member of the Sociology Department at Hacettepe University, and my cosupervisor Prof. Dr. Feryal Turan from the Sociology Department of Ankara University for introducing me to the world of combustion research and instilling in me the qualities of being a good researcher and sociologist. I would also like to mention the respondents who hold the main part of this research. I received a Turkish government Fulbright Scholarship for my Ph.D. program. Since this paper is developed from my Ph.D. dissertation, I thank the funding body. This scholarship was previously provided under The

Ministry of Education, Turkey, and later under The Presidency for Turks Abroad and Related Communities (ytb.gov.tr). I do believe that without this scholarship, I would not have been able to complete my Ph.D. research smoothly. No potential conflict of interest was reported by the author.

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