



Reason Behind Living in a Disaster-Prone Coastal Region: A case study on Sarankhola Upazila, Bangladesh

Tanmoy Malaker^{1*}, Lopa Islam², Saurav Das³

¹Student, Master of Urban & Rural Planning, Science, Engineering & Technology School, Khulna University, Khulna-9208; Bangladesh.

²Assistant Professor, Urban & Rural Planning Discipline, Science, Engineering & Technology School, Khulna University, Khulna-9208; Bangladesh.

³Student, Master of Urban & Rural Planning, Science, Engineering & Technology School, Khulna University, Khulna-9208; Bangladesh.

***Corresponding Author:** Tanmoy Malaker, Student, Master of Urban & Rural Planning, Science, Engineering & Technology School, Khulna University, Khulna-9208; Bangladesh

Abstract: While the entire world is concerned about climate change and natural disasters, disaster-prone developing countries are struggling to keep pace with developments due to frequent natural disasters. Countries like Bangladesh which have a 700 km long exposed funnel-shaped southern-coastal shoreline and disaster-prone geographical location, experience increased vulnerability to natural disasters every year. Despite being vulnerable to frequent natural disasters, people are still living in these coastal areas let alone evacuating the region. Even after severe disaster strikes, very few people are intended to migrate from their place, where the larger share remains in their places despite vulnerabilities. The southern coastal region of Bangladesh is no different, and people who are living in these regions are struggling with frequent natural disasters along with extreme poverty. Despite being a hostile place for living in terms of coastal natural disasters, the region never remains devoid. In contrast, it has a vibrant livelihood diversification, a small but thriving economy, and innovative adaptation measures to coastal disaster vulnerabilities. This research paper aims to contribute to the relevant literature by identifying the reasons and factors that make the people stay in their place, despite frequent disaster phenomena. This research paper brings a closer look into the challenges, adaptation mechanisms, and factors that are turning a disaster-prone coastal region into an inhabitable and economically vibrant place to live in.

Keywords: Disaster, Coastal Region, Livelihood, Migration, Coping up.

1. INTRODUCTION

The geographic location of Bangladesh makes the natural disaster an inevitable phenomenon, which makes it the fifth most disaster-vulnerable country in the world (Mallick et al., 2017; UNU-EHS, 2016; UNEP, 2001). Every year several natural disasters affect the country, especially the southern coastal zone including floods, cyclones, and some exogenic hazards like river erosion, salt intrusion, and drought (Alam et al., 2019; Sarker et al., 2019). In the last 30 years, Bangladesh has experienced about 219 major natural disasters, which accounted for about \$16 billion in economic losses along with hundreds of casualties (Torikul, 2015; Mallick et al., 2017). The southern coastal region of Bangladesh is highly exposed to disasters like cyclones, floods, river erosion, and tidal surges (Mallick et al., 2017). In recent years the cyclones SIDR and Aila took thousands of lives and cost over \$1.7 billion, and \$295 million respectively (IOM, 2009). Despite having anxiety and uncertainty, the people are still living in these disaster-prone areas. About 35 million people are living in the coastal belt of Bangladesh, where they mostly depend on agriculture, and natural resources like mangrove forests or fisheries for their living (Ahmad, 2019). Being poverty-stricken along with hostile geography the people of these areas are becoming more vulnerable to a natural disaster (Mallick et al., 2017). Although their indigenous coping up strategies and organizational interventions are helping them to cope-up, due to the frequent outbreaks they are unable to recuperate their economic stability completely (Torikul, 2015) before another strike. While migration is a common scenario in such situations, most of the people are still living in these areas and there is a significant

amount of back migration after a while where they are living anxiety and fear, with little hope, indigenous coping-up strategies, and some institutional help. The research explores the underlying factors that make them live in the utmost vulnerable coastal region of Bangladesh in terms of natural disasters and explores the extent of their adaptation strategies along with the institutional interventions.

2. BACKGROUND AND CONCEPT

Bangladesh due to its geographical location, higher population density, poor infrastructure, lack of effective disaster strategies, and poverty became highly exposed to the disaster phenomenon (ATLAS, 2014; Mallick, 2017). Bangladesh has been identified as the 7th most disaster vulnerable country in the world with a high CRI (Climate Risk Index) score of 28.33 (Germanwatch, 2019). Only 10 percent of the people of Bangladesh are living above one-meter sea level (Islam, 2017), where the low-lying topography of southern Bangladesh has made these areas extremely vulnerable to natural disasters and sea-level rise (Abedin and Shaw, 2013). About 50 million people in Bangladesh are being affected by natural disasters every five years, and the people living in the coastal zone are extremely vulnerable to natural disasters. As the coastal population is expected to be 57.9 million in 2050 (which is currently about 35 million), the Coastal Zone of Bangladesh including 19 districts and 147 Upazila is going to be the most vulnerable and concerning zone (Hossain, 2013). Where 165 million people over the world are displaced from their places due to the disasters between 2008 to 2013, Bangladesh is in a threat of coastal migration of about 20 million people because of natural disasters (MoEF, 2008). The sudden onset of disasters like the cyclone is increasing in the coastal region of Bangladesh (Water Aid, 2012), which is further declining the disaster vulnerability of the coastal regions of Bangladesh. Although the displacement is mostly triggered by disaster strikes, economic and social factors like resource availability, social capital, and livelihood opportunities also determine migration possibilities (Martin et al., 2013).

Being a disaster-prone country, disaster-induced migration is one of the five major reasons for migration in Bangladesh (Islam, 2017), where disaster-induced migration of Bangladesh is the most cited migration type in different literature (Ahsan et al., 2011; Parvin et al., 2016). Although Bangladesh is facing the other four types of migration too (political, social, demographic, and economic), disaster-induced migration causes a huge displacement from the southern region of Bangladesh, and most of them (78%) move toward nearby cities namely Khulna, Bagerhat and Satkhira (Alam & Mille, 2019; Mallick and Vogt, 2014). Economic migration is very strongly related to disaster-induced migration, but sometimes can be categorized as a voluntary migration with a view to economic wellbeing (Alam & Mille, 2019). On the other hand, people with a better economic situation also tend to migrate from a vulnerable places to avoid disaster events, but in a more planned way than the migration of the poor (Islam, 2017). The poor people mostly try to stay in their place until they have nothing left for their livelihood strategies.

Over the last 30 years, the disaster frequency has increased in southern Bangladesh (Hossain & Paul, 2018) which has affected the coastal areas in different ways. Over the last thirty years, the coastal zone of Bangladesh has experienced nearly 200 climate-related disasters accounting for around \$16 billion in economic losses including complete damage to assets, property, livelihoods, and thousands of death tolls (Torikul, et al., 2015)

Table1. Disaster history of Bangladesh (Minar et al., 2013).

Date	Maximum wind speed (km/hr.)	Storm surge height (Meter)	Death toll
11 May 1965	161	3.7-7.6	19,279
15 Dec 1965	217	2.4-3.6	873
01 Oct 1966	139	6.0-6.7	850
12 Nov 1970	224	6.0-10.0	300,000
25 May 1985	154	3.0-4.6	11,069
29 April 1991	225	6.0-7.6	138,882
19 May 1997	232	3.1-4.6	155
15 Nov 2007 (SIDR)	223	--	3406
25 May 2009 (AILA)	92	--	190

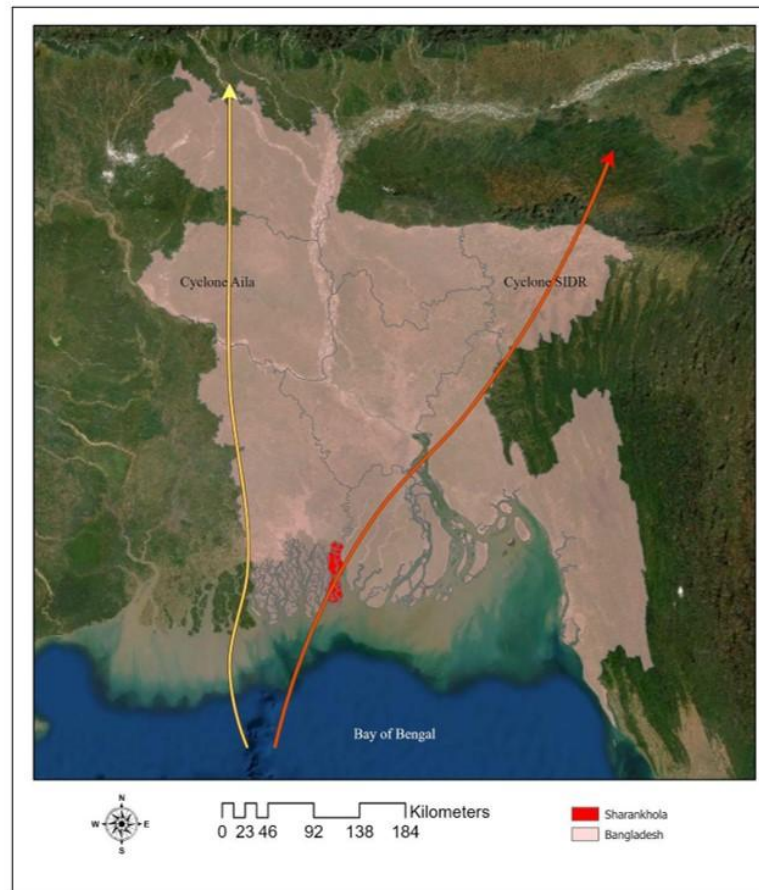


Fig2. Path of Last Two Super Cyclones (SIDR & Aila).

Although the casualty rate is decreasing as a result of different initiatives like building up cyclone centers and other physical development, the economic loss remained inevitable because of increased disaster frequencies in the southern region and having no sustainable livelihood strategies (Sarker et al., 2020). The livelihoods of the people living in the southern coastal area of Bangladesh are mostly dependent on agriculture, fishing, farming, and agricultural laboring (Sarkar et al., 2020; Mallick et al., 2017; Minar, 2013), which indicates a higher dependency on climatic conditions for a living. frequent disasters increase vulnerability thus causing post-disaster displacement (Alam& Miller, 2019; King et al., 2014; Torikul, et al., 2015). While some literature is pointing to the exposure factor instead of the frequency of disaster outbreaks for displacement (Hagman, 1984), some are blaming the livelihood challenges and vulnerabilities for mass displacement (Sarker et al., 2020). Although there is a common relation between climate hazards and migration (IOM, 2016), the complex socioeconomic matrix along with the natural phenomenon strengthens the disaster-induced migration (Islam, 2017). The lack of disaster adaptation strategies, poor physical infrastructures, and poverty are the main factors that are increasing the disaster impacts, as well as climate-induced migration (Alam& Mille, 2019; Mallick et al., 2017). Despite frequent disaster vulnerability, the cause behind living in a disaster-prone area is an important issue to explore as the number of disasters and disaster-vulnerable people is increasing (Gustafsson &Niskala, 2013). Although plenty of research has been conducted on disaster-induced migration, there is a gap in understanding the reasons behind living in these vulnerable areas. This research has tried to contribute to the literature by identifying the factors that play behind the decision-making for living in an area despite disaster vulnerability with an aim to dig out the complex socioeconomic factors that help the decision-making.

3. STUDY AREA

Bagerhat is one of the southernmost districts of Bangladesh, and Sarankhola is one of the most cited disaster vulnerable Upazila (sub-district) of Bagerhat having an exposure to the Bay of Bengal. The area coverage of this Upazila is about 752.20 square kilometers and is geographically located between 22°33' to 21°49' north latitudes and 89°32' to 89°44' east longitudes, among which about 594.58 sq

km is of rangeland which is a part of the worlds largest mangrove forest ecosystem named Sundarbans (BBS, 2011). About 48 Upazila of Bangladesh is exposed to the Bay of Bengal, where Sarankhola is one of them (BBS, 2011). It is bounded on the north by Morrelgonj Upazila, on the east by Pathorghata and Mathbaria Upazila of Barguna district, on the west by Mongla, and the south by the Bay of Bengal. The total population of this Upazila is 1,19,084 where the number of the male and female populations are respectively 62400 and 56684 (BBS, 2011). Sarankhola Upazila consists of 5 unions or GO codes (Dhansagar-19, Kontakata-38, Rayenda-57, Southkhali-76, and Sharankhola Range-97) and 45 villages, where the climatic condition is warm-humid and most of the time it appears to be identical (Ministry of Disaster Management and Relief of Bangladesh, 2009). Being adjacent to the Bay of Bengal the salinity intrusion is a great problem in this area, although it is partially good for shrimp cultivation while the excessive increase due to tidal surges and human intervention the agricultural production is declining (Barai et al., 2019).

Sarankhola faces at least one major natural disaster almost every year. Where the coastal morphology (funnel-shaped coastal line) of southern Bangladesh increases the impact of natural hazards. In 2007 the devastating super cyclone ‘SIDR’ with a 20-foot tidal wave and 220-240 km/hour wind speed hit on coastal Bangladesh and caused the enormous economic and human loss (3406 people and 3, 82,000 livestock mostly cattle) throughout the southern coastal belt, and Sarankhola Upazila is one of the extremely affected areas (Mallick et al., 2017). In 2009 just two years later of the SIDR the cyclone Aila again hit the southern coastal region where 190 people died and about 1 million people became homeless (Mallick et al., 2017). Despite these frequent natural disasters, saline intrusion, declining agriculture, and sea-level rise, people of this area are living in their place, although the frequent disaster and livelihood uncertainty makes the choice of living in this disaster-prone coastal region more difficult.

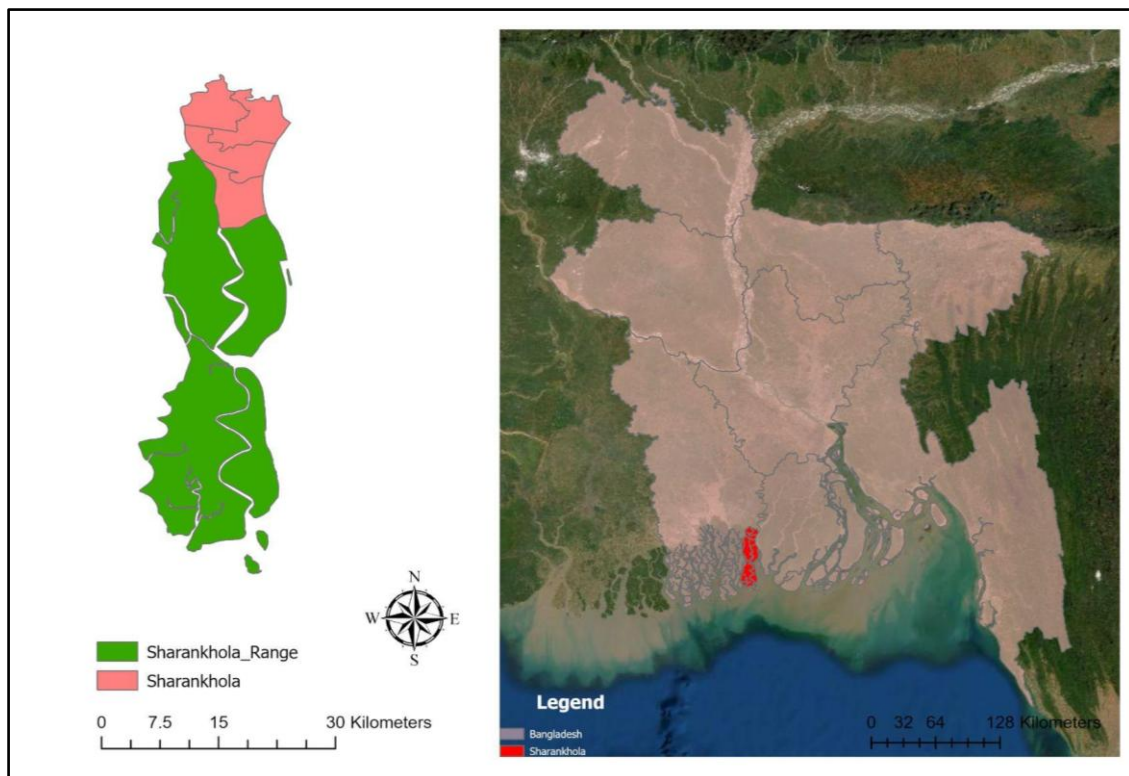


Fig1. Sarankhola (Study Area)

4. METHODOLOGY

Sarankhola Upazila of Bagerhat district has been studied as a study area, which is one of the most disaster-vulnerable area of Bangladesh because of its geographic location (UNU-EHS, 2016). It has been facing the continuous severity of natural calamities, and an ideal place to represent and analyze the livelihood challenges of a disaster-prone coastal region. The area was severely affected by two

super cyclones AILA and SIDR (respectively in 2007 and 2009) and witnessed a great extent of disaster-induced migration during the post-disaster period (IOM, 2009). All the unions of Sarankhola (Dhansagar, Rayenda, Khontakata, and Southkhali) have been studied to collect the information from the respondents. To determine representative sample size, the formula proposed by Yamane (1967) has been used.

$$n = N/(1+Ne^2) \quad (i)$$

[Where, n = sample size, N = population size (in this study the number of households in the sample frame), and e = level of precision/margin of error]

The formula is widely used in social science when the population is finite, but the variance is unknown. The margin of error in selecting the sample size is 8%, the level of Confidence is 93% and the response distribution is 50%. The resulting sample size is 128 households, where the total household number in Sarankhola Upazila is 26292 (BBS, 2011). The data were collected on the household basis rather than individuals where the range of error is considerable for social research (10%), thus the sample size can be considered strong enough to justify the findings.

Considering the time, a total number of 125 households were studied as the sample size with a semi-structured questionnaire following a random sampling method (Longhurst, 2016). The FGD and the piloting helped a lot to make the questionnaire stronger and more responsive to the actual scenario. To get a wider understanding, interviews were taken to gain an in-depth understanding of the overall situation of the study area. And finally, data analysis has taken place through the Mixed Method research approach. For a better understanding, analysis, and representation, the data are analyzed following both quantitative statistical tools along with qualitative understanding from FGD and interviews as well (Host et al., 2006). To understand the actual causes behind living in this disaster-prone area of the people the interviews and the FGD were conducted extensively with proper rapport building and higher participation.

5. SOCIOECONOMIC OVERVIEW

Most of the respondents of Sarankhola are economically dependent on agriculture (51.85%) and fisheries for their living (BBS, 2011), where few of them are engaged in the honey collection, Golpata (Nipa Palm) collection, small-scale business, and day laborer. With an average family size of 5 members, about 94.8~95 percent of respondents are living under the poverty line (defined by the World Bank as 1.90 \$ per person per day), and the rest of them (5.6%) are low-income households representing the economic vulnerability of the area. About 48.74% of people have ownership of agricultural land, whereas 51.26 % of people are landless and the people living in rural areas have less landownership than the people living in urban areas (BBS, 2011). The people mainly grow paddy and pulse as their main agricultural products. About 26.79% of people have access to tube-well water and 12.03% of people have access to tap water, whereas the rest of the people use water from ponds, rivers, or other natural sources with the sanitation of 37.96% only and about 5.02% households are still use open defecation (BBS, 2011). Although the income is lower compared to the World Bank's standard, the people living in this area somehow surplus the expenditure (Fig. 03). As most of the respondents consume foods grown by themselves, or simply catching fish from the river makes it possible to surplus the expenditure. Another reason for managing life with such a lower income is the lower standard of living or the lower living cost.

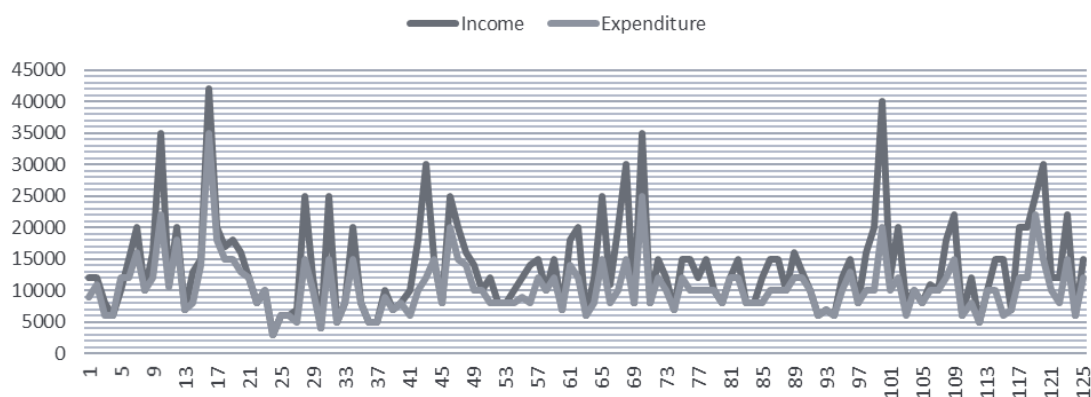


Fig3. *Income Vs Expenditure of the Respondents.*

On the other hand, government facilities like subsidized education and free health facilities are minimizing the living cost as well. NGOs are playing a strong role by offering a range of economic facilities like microcredit financing, and development incentives (Mallick et al., 2017) so that the poor and disaster-stricken people could fight against vulnerability. The out-migration is mostly caused by the fear of losing lives and assets quickly after the AILA and SIDR, but a large share of the migrants returned after a few years of living in cities or somewhere else. The low cost of living and the facilities provided by the Government, NGOs, and access to natural resources makes them return to the place they belong. Another crucial reason is the unskilled and unfit labor for the outer world, which made them come back. The natives consider the deadly disaster as an uncertain phenomenon which is not very often to occur, where the livelihood facilities/strategies are more important to them.

Among the coastal devastating disasters in recent years, the area was mostly affected by the SIDR (Nov 26, 2007) and AILA (May 26, 2009), where SIDR was the most devastating cyclone in the past 131 years of history of Bangladesh and the Sarankhola was the most affected area all over the coastal region. This results in a great out-migration because of extreme loss in terms of lives and assets, and the fear of being affected again. On May 26, 2009, the AILA cost at least 339 lives and a total of \$295 million just after two years of SIDR (Ministry of Disaster Management and Relief, 2013). These two consecutive disasters have influenced the disaster-induced migration to a great extent and pushed people to migrate from the southern coastal region of Bangladesh and the Sarankhola Upazila is no different. Cyclones with a magnitude like these two (SIDR and Aila) are not common, whereas another cyclone of this magnitude in recent history was witnessed in 1988 before these two. Although cyclones like SIDR or Aila are not so common, frequent flooding is a common scenario in this area and almost all the Unions within the Sarankhola Upazila have experienced one major flood every two years. The problem is increasing with the rising sea level, which is affecting daily life and economic activities. Although the floods almost affect all the areas, Dhansagar and Khontakata suffer the most because of their lower elevation. If the water rises just one meter, these two unions could be flooded. While flooding is affecting most of the areas, tidal surge or storm surge occurs mainly in the flood-vulnerable area of Dhansagar, Khontakata, and other comparatively low-lying riverside areas. These calamities are affecting agricultural production, where the floods are affecting the aquaculture and fisheries as well. Although the river erosion is somehow becoming manageable nowadays due to the different initiatives from the government by establishing embankments on the riverbanks with concrete, some areas adjacent to the Baleshwar River are being affected by severe river erosion. Among these phenomena of this coastal region, cyclones are the most devastating in nature and severely affect livelihoods. Every disaster has its effects on livelihoods and the economy, but cyclones are deadly most of the time. Because of cyclone SIDR, about 22% of households among the respondents of Sarankhola have lost their family members or have injured family members in any natural disaster, where some of the families have lost more than one person from their families. These awful disaster experiences are forcing people to migrate, but despite the severity and possibility of further disaster strikes most of the people are still living in their places.

5.1. Factors Minimizing Disaster Costs

The disaster history of Sarankhola potentially identifies cyclones as the major factor of coastal disaster vulnerability, which seeks to identify the measures that have been taken to minimize the cyclone impacts. Cyclone shelter is one of the major disaster risk reduction measures that have been taken seriously after the two deadly cyclone phenomena in 2007 and 2009 to make the coastal areas resilient to disaster events. In Sarankhola Upazila about 74 cyclone shelters are contributing to strengthening the resilience mechanism. These cyclone shelters are covering most of the areas of Sarankhola to provide emergency shelter during disaster events not only for the cyclones but also for other disasters like floods and tidal surges. Most of the families living in Sarankhola have access to cyclone shelters and have at least one cyclone shelter within one kilometer of their location. About 83% of respondents are satisfied with the availability of cyclone shelter and its overall condition and think that it has decreased the disaster risks to a great extent. Where some households have access to more than one cyclone shelter within a one-kilometer radius due to their geographic location, North Kadamtala village of Rayenda union and the northern part of Dhansagar union have limited access, and the condition of the cyclone shelter is not well enough which seeks for further planning and proper maintenance mechanism. There is evidence of having closer cyclone shelters by the rich, as they can donate land for making the cyclone shelter in case of land deficit (Mallick et al., 2017). The rest of the people living in other parts of the Upazila identified the overall condition as moderate to good. Most of the cyclone shelters in Sarankhola were constructed after the SIDR strike (2007), which potentially decreased the migration and the death rate from this coastal area after those two cyclones gradually. A decent number of cyclone shelters and the accessibility to them during the disaster period minimizes the disaster's impacts on assets and human lives. People are accessing these facilities eagerly as they already have a bitter experience in prior cyclone phenomenon, and from their past learnings, they are conscious about their lives and assets thus minimizing the disaster costs.

Forecasting is another crucial part of disaster management that has been improved over the last decade (Mallick et al., 2017), where about 89% of the respondents from Sarankhola are satisfied with the alerting system, which includes announcing within the coastal areas using loudspeakers, pulling up red flags, and sometimes helping the people, especially the older adults and the disables to reach the cyclone shelter. Besides the scientific disaster forecasting, about 43% of respondents depend on indigenous knowledge to predict the upcoming disaster like extreme heat, heavy rainfall, extreme weather, peculiar wind direction and pattern, rising water level, the color of the sky, sound of the wind, etc. on the other hand, different NGOs are working on to increase the resiliency by building up knowledge and know-how during the disaster period, disaster risk reduction initiatives. Organizational initiatives to cope with coastal disaster vulnerabilities are better than what it was a decade ago in Sarankhola. With the help of organizational support and forecasting, about 62% of respondents are accessing the cyclone shelter in an alarming situation and always remain conscious of the weather forecast. The rest of the people take shelter in safe places like neighboring houses, mosques, schools, colleges, etc. Although people are now much more conscious about sheltering themselves in cyclone shelters, some people, especially having extended family with elderly members, intend to stay at home (Mallick et al., 2017). Still, these understandings are helping to reduce the vulnerability of the coastal region of Bangladesh.

In Sarankhola, the Government has taken several steps along with different NGO support to minimize the disaster impacts. Almost all the people (100% in Sarankhola and Rayenda) got new houses from different organizations (Funded by Muslim AID, World Bank, etc.). The road communication system was also developed for better communication and accessibility for the people to a large number of cyclone shelters were built after the disaster SIDR with the help of USAID to cope with coastal disasters. The World Bank has funded an embankment project beside the river line of Sarankhola Upazila to prevent floods and tidal surges. These measures reduced the disaster vulnerability of the people to a great extent and made the people rethink migrating from here. Organizational initiatives to cope with coastal natural disasters have also become effective and well organized over the last decade in these regions. The scenario was different before the disaster SIDR and AILA, and after these devastating disasters along with the organizational concern, people are now conscious about sheltering themselves and their belongings during the disaster period. These understandings are triggering a safe and resilient livelihood even in these most environmentally vulnerable coastal regions of Bangladesh.

5.2. Factors Influencing Living in a Disaster-prone Place

There are myriad studies that can be cited on the problems of living in a disaster-prone coastal region, but very few of them contributed to understanding the factors that make people choose to live in a disaster-prone coastal region despite vulnerability and uncertainties. The disadvantages of living in a disaster-prone region always overshadow the reasons behind living in a disaster-prone region as well as the factors which make it economically vibrant by providing livelihood opportunities based on indigenous knowledge and skills. Access to natural resources, aboriginal livelihood strategies, social capital, and skills that are developed considering geography are some of the major reasons to live in these vulnerable areas. The people living in Sarankhola are mostly farmers and fishermen, who are highly dependent on natural resources with minimum skills. They don't have any skills that could influence their decision to move, where moving to a city or somewhere else leads to a muscular job with a lower wage is the only option remaining for them along with higher living costs. Although some people of Sarankhola are willing to move to the cities to avoid the deadly impacts of coastal disasters, the lack of assets, social capital, and the lack of proper skilling to adopt new livelihood strategies in cities discourage them from migrating. There are numerous cases of coming back from cities by failing to adopt new livelihood strategies as well (Mallick et al., 2017). The discussion may raise the question that if the people are living here because they have no other choice? which is not true at all. The people are mostly living here because of their belongings to the place, access to natural resources, convenient livelihood opportunities, and rich social capital (Gustafsson and Niskala, 2013).

Besides the advantages of having convenient livelihood opportunities and access to natural resources, different organizational incentives are making them resilient to climate vulnerability, especially after the SIDR and Aila. Social networking or social capital plays a strong potential role in 'living in place' as well as preventing migration. One of the respondents, who is a fisherman of the Southkhali union, mentioned how social bonding's influenced him to stay in Sarankhola despite frequent cyclones and other natural disasters. In his words, the tradeoff for the disaster is not worth staying here as he has no skills to adopt new livelihood strategies in cities or somewhere else (Ljungberg and Wier, 2012; Natasa et al., 2014). Although a myriad of the literature has proved the relationship and given conceptual modeling in relation to coastal disaster with migration (Nielsen, 2004; IOM 2016), the relation may not be as simple as we think. Thousands of factors are influencing the relationship between disaster and migration thus pushing towards more complexity (Sarker et al., 2020), and we need to have a better understanding of those factors rather than simplifying these scenarios for having correlations. Here is a quote from one of the respondents—

“Disaster hampers our life for a fewdays, sometimes for months but uncertainties are also remaining in the cities. The best thing here is that we don't have to starve! We have school, college, hospital, cyclone shelter, better roads, and transport facilities now, then why should we migrate to cities?”

-Md. Shahjahan; A Fisherman of Southkhali Union; Sarankhola.

Besides, the government has taken several strategies with organizational rebuilding and policy formulation to create responsible and rapid responses to disaster phenomena under the Ministry of Disaster and Relief. The new organizational mechanism is being shifted its paradigm from relief and development activities to more sustainable and disaster adaptive strategies and developments which include increasing the availability of cyclone shelters, early warning systems, building roads to increase accessibility as well as rapid response and post-disaster treatments. In a nutshell, the whole system is focusing on the DRR (Disaster Risk Reduction) approach.

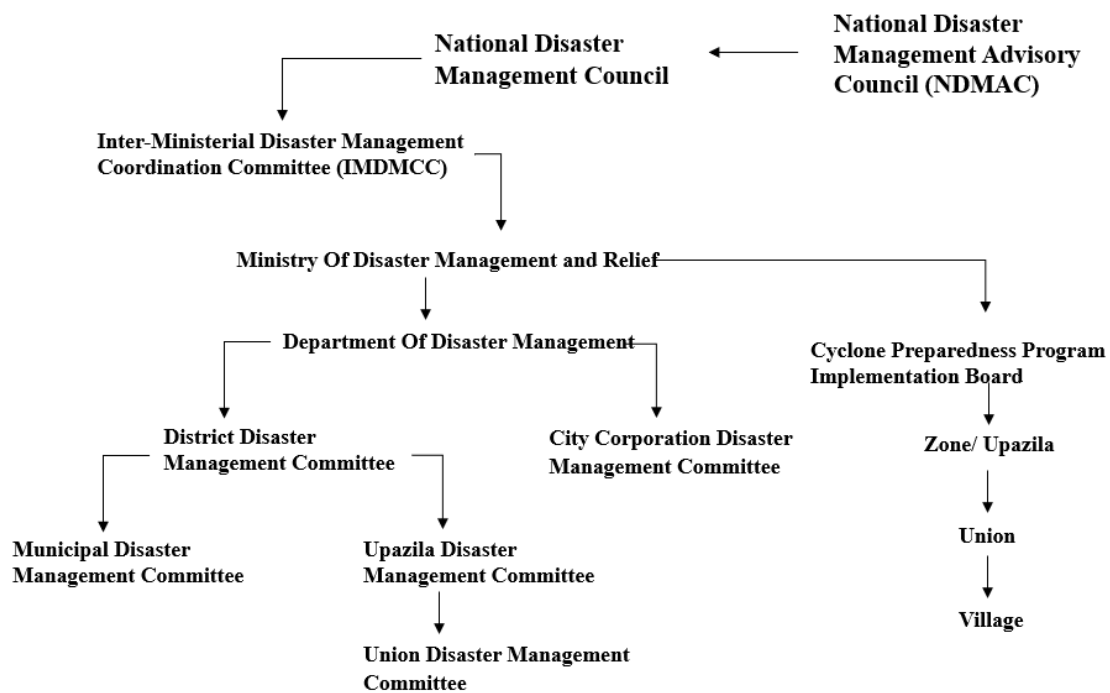


Fig4. Disaster Management Organogram of Bangladesh

The following table represents the findings of the study from the respondents which influenced their decision making for living in Sarankhola despite disaster vulnerabilities.

Reason Behind living in a Disaster Prone Coastal area:
Respondents Perspectives

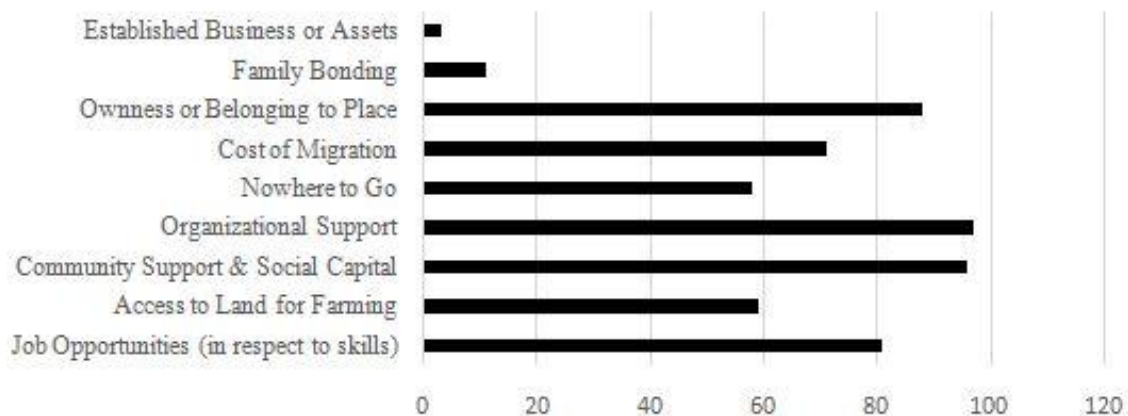


Fig5. Reason Behind Living in a Disaster-Prone Area

The findings represent that the organizational incentives, social capital, availability of work that requires no skills, and access to farming are some of the major factors influencing living in Sarankhola despite disaster vulnerabilities. Having no places to move in or poor economic conditions which can't afford the cost of migration is another important factor that declines the rate of migration. Organizational and community support or social capital is the most phenomenal factor behind living in this climate-vulnerable coastal region despite disaster vulnerability. All these factors make the relationship between disaster and displacement a more complex phenomenon than an oversimplified thought that the frequent disaster will always result in mass exodus (Maferetlhane, 2012; Espesor, 2014; Natasa, 2014; Sarker et al., 2016).

Access to natural resources, or availability of natural resources is also an important factor influencing staying in a disaster-vulnerable place. People living in Sarankhola have access to collect woods and

Golpata (Nipa Plum) from Sundarbans mangrove forest (about 76%) and honey (about 26.2%) as well, but the access to grazing lands is shrinking because of drastic land-use change and booming of coastal agriculture and population which is estimated as 57.9 million by 2050 (Hossain, 2013). The farmers mostly cultivate rice and vegetables where paddy is their main crop (BBS, 2011), but shrimp cultivation is at its peak nowadays. Shrimp seed collection from the rivers in the coastal shoreline of this region is a very popular and thriving business as it requires no skills at all, which has created a livelihood opportunity for the people living in Sarankhola even from other places people come here to work as a shrimp seed collector. This Wild Shrimp Larvae collection from the coastal rivers and shoreline is creating at least 0.42 million jobs every year along the coastal belt (Azad et al., 2007). Although the opportunity is seasonal in nature and only in a specific period it is viable, livelihood opportunities like these seek very little to no skills which are helping to form a diversified and resilient livelihood opportunity for the people living here which results in 'living in place' instead of migration despite disaster vulnerabilities.

5.2.1. Availability of Khas (State-Owned Vacant) Land

Khas land is the government-owned fallow land, where nobody has property rights except the govt. itself (State Acquisition and Tenancy Act of Bangladesh, 1950). These lands are deemed to be owned by the govt. and available for allocation according to the government priorities and needs. In the coastal area, Khas land is termed as 'Char land' (accreted). Annually 5080 hectares (estimated from 1973 to 2000) of land have been accreted in the coastal area of Bangladesh (Islam, 2006), which provides the disaster-stricken people a place to settle for the homeless after the coastal disasters. Another type of Khas land is the roadside land which is a part of the right of way and is owned by the Roads and Highway Department but remains unused for further broadening of roads. In Sarankhola the disaster affected people, especially those who lost their lands due to river erosion or flooding are occupying these lands for living and making new houses. As it is free and permission of local politicians or leaders is enough to occupy, people having no place to move in occupy newly accreted land thus helps to avoid the migration cost as well as migration (Mallick et al., 2017). It potentially offers tenant security to these poor and landless people which helps them to live here and discounts the risk of disaster vulnerabilities. Although only 7 % of respondents are depending on the availability of Khas lands or consider Khas lands could be an option for them to stay. People who have no land ownership, or no land left to stay, Khas land is a great factor in their decision-making of migration.

5.2.2. Relief Activities

Different NGOs along with the Government institutions and foreign aid helped the disaster-stricken people during the post-disaster period of SIDR and Aila. Most of the people of Sarankhola Upazila received post-disaster incentives including money, food, livestock, infrastructure, fresh drinking water, medicine, etc. Even these days, after a decade of cyclone SIDR, some people are still getting organizational support who are affected by SIDR or Aila. This help from the govt. and NGOs, especially the long-term support strategy helped a lot to revitalize the socioeconomic condition of the people living in Sarankhola Upazila. About 59.2% of the respondents are satisfied with the post-disaster relief activities, whereas only 1.6% of people got no direct relief goods but they got new houses to live in. These long-term post-disaster activities helped to increase the recovery and resilience to disaster. The organizational support in a continuous long-term manner is helping the people of Sarankhola to stand against and cope up with further disasters and initiating the 'living in place' process, despite disaster vulnerabilities and about 90.4% of the respondents are satisfied with the organizational support.

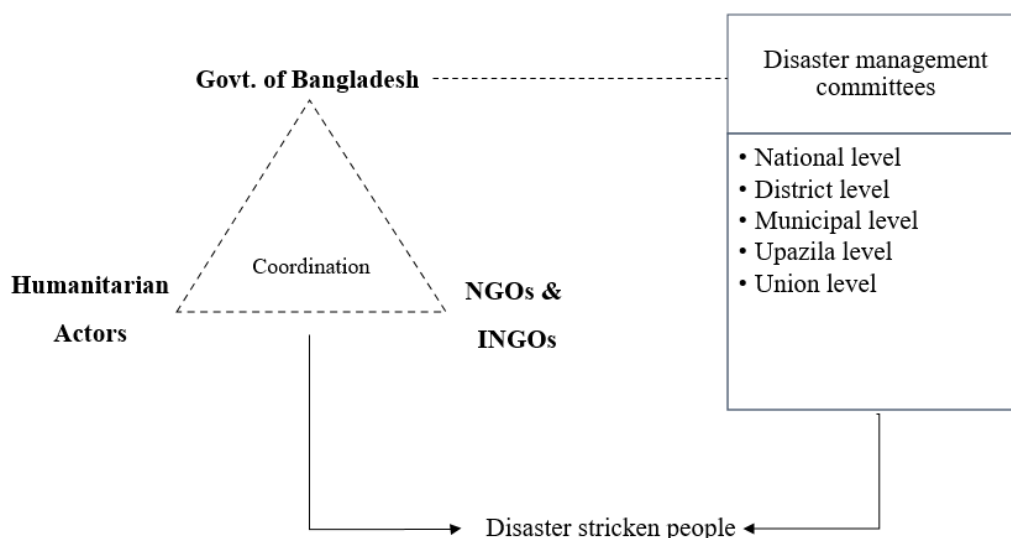


Fig6. Response and Coordination in Disaster Emergencies.

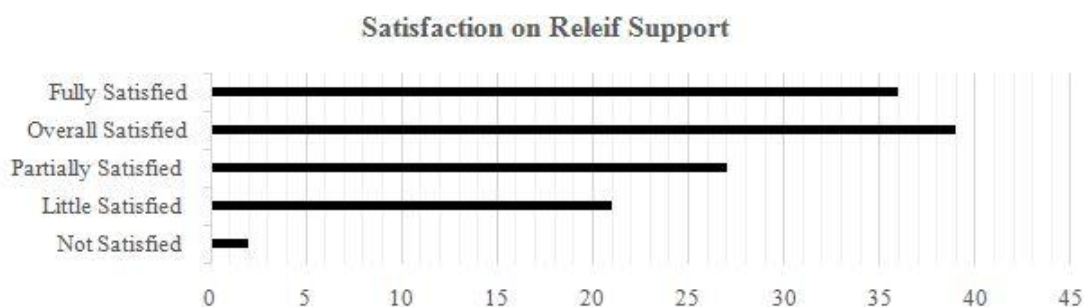


Fig7. Satisfaction Level on Getting Relief Goods

The results represent that most of the people are satisfied with the relief activities (with a standard deviation of 1.110), where only a few people are not satisfied with the relief activities and organizational help, where they claim that because of political interference and social power structure, they didn't get enough relief that they deserved compared to the others, which seeks for more transparent allocation of resources and listing of the affected people.

Table2. Forms of Relief Goods

Relief type	Percent (%) Received
Monetary	78.3
Livestock	57.5
Infrastructure	87.5
Food	99.2
VGF Card	28

Although the affected people have received various types of facilities, the VGF card was given only to the extreme-poor who are considered as unable to recover their condition (28% of the respondents) under the instant relief system and need long-term help. It helps to make the extreme-poor able to recover the loss over the year and establish a better economic condition as well as assets to cope with further disasters and could live in a place like Sarankhola where a natural disaster is a very common phenomenon. The people who are migrated from this place towards the cities in search of a better life, either have a strong social connection to get an instant job there according to their skill or have enough assets to start a new beginning in cities like Khulna or Dhaka. Among the respondents, about 47% of the household have family members or relatives who have come back after a few years of spending in cities for a living. They think the housing cost of living in cities is a burden, especially for those who already have lost their assets due to disasters. Although they didn't have a place to live after

the disaster when they came to know about the aid for the disaster-stricken people by gov't. and NGOs people started to come back for a cheaper living cost. The Khas lands here potentially played a significant role as well as the socio-political capital in their native place which is undoubtedly stronger than they had in the cities or somewhere else.

5.2.3. Individual Adaptation Strategies

The people of Sarankhola have taken some initiatives of their own to minimize the disaster vulnerabilities as well. People remain alert and concerned about available weather forecasting, especially during the cyclone seasons (May to Nov). They are also reducing their flood vulnerabilities through structural modification of their houses using cyclone resilience-building materials (31%), developing the house connected to the adjacent road (73%), and possible nearest location from cyclone shelters (19%) for a quick escape, where the last one requires land ownership near any cyclone shelter. Making new houses following the disaster-resilient design pattern suggested by NGOs for reducing the risk is spreading day by day. Sometimes people repair the embankments by themselves instead of depending on organizational help or funding. Among the respondents considering disaster frequencies and magnitude, about 79.2 % have modified the structure of their house, 26.4 % used government-owned or Khas lands for building houses, 80 % people are concerned about weather forecasting, and 77.6 % are engaged in integrated community work to reduce their disaster vulnerabilities. While the people are concerned about their vulnerabilities, some training facilities from different NGOs and Govt. projects are helping to increase their resilience to disaster. Different NGOs (Asroy Foundation and Red Crescent Society) are providing training on disaster preparedness to reduce the losses for the upcoming disaster and cope up with it. About 62% of people among the respondents got preliminary training on disaster preparedness. From the training, they get the different skills to adopt diversified job opportunities, disaster preparedness, and duties during pre-disaster and post-disaster periods. The study reveals that people who got disaster-related training are more likely to take shelter at cyclone shelter points. Of the respondents surveyed, 67.33 % of people are taking shelter in cyclone shelters during disaster phenomena, which is helping to cope up with the disaster events, thus enabling people to live in this area despite frequent disaster events.

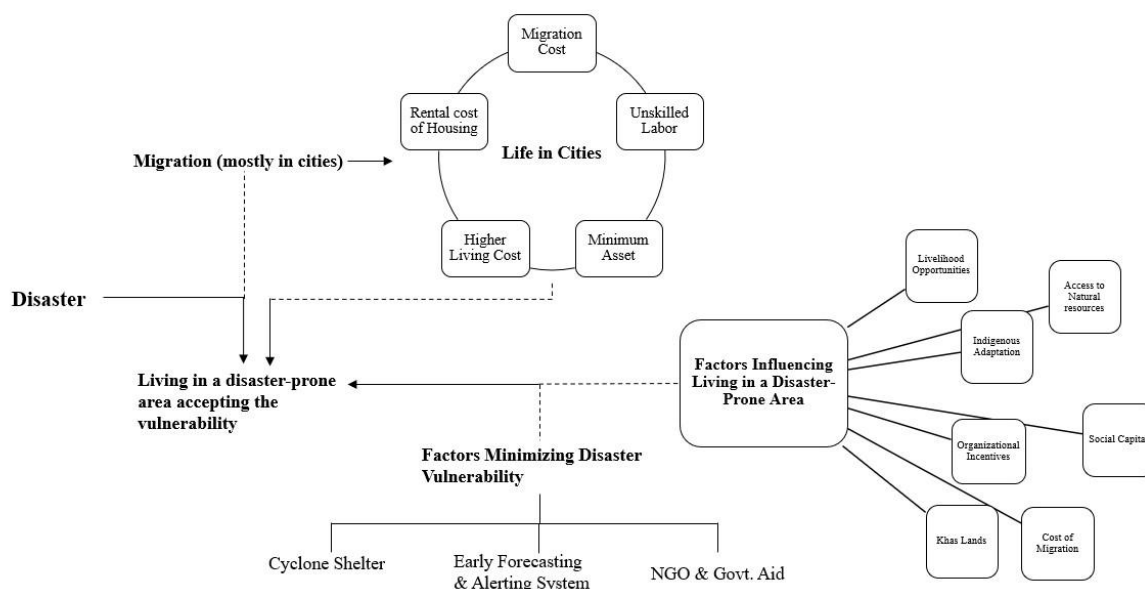


Fig8. Factors Influences Living in a Disaster-Prone Coastal Area of Bangladesh

6. CONCLUSION

It is difficult to figure out a single specific reason why people live in an environmentally vulnerable area but a set of reasons. Every geographical location has both advantages and disadvantages. It is hard to discover all the factors behind it and measure which one is superior (Nielsen, 2004). Many latent factors like the psychology behind living in a disaster-prone coastal region could be a great thing to research. Aged people (sixty years or more) most of the time don't want to move from where

they belong, so various factors may play a complex role in the decision-making of migration. From the collected information and analysis, it is visible that there is always a threat of natural calamities to the people living in the southern coastal region of Bangladesh. But their experience, knowledge, and organizational initiatives to cope with the natural disasters, and make them to stay in their place (Maferethane, 2012). These initiatives and people-organizations willingness and strategies turned the hostile coastal belt into a hotspot of versatile livelihood and a place to live in with plenty of natural resources (Espesor, 2014). The benefits the indigenous people living in this region get from nature always surpass the uncertainty.

REFERENCES

- [1] Abdullah, A. A., & Murshid, K. A. S. (1986). Inter District Changes and Variations in Landlessness in Bangladesh. *The Bangladesh Development Studies*, 14(3), 97-108.
- [2] Abedin, M. and R. Shaw (2013) Safe water adaptability for salinity, arsenic and drought risks in southwest of Bangladesh, *Risk, Hazards & Crisis in Public Policy* 4 (2): 62–82.
- [3] Ahmad, Z. (2011). Impact of alluvial deposits on soil fertility during the floods of 2010 in Punjab, Pakistan. *Research Findings, International Potash Institute*.
- [4] Ahsan, R., S. Karuppanan and J. Kellett (2011) Climate migration and urban planning system: A study of Bangladesh, *Environmental Justice* 4(3): 163–170.
- [5] Alam, A., & Miller, F. (2019). Slow, small and shared voluntary relocations: Learning from the experience of migrants living on the urban fringes of Khulna, Bangladesh. *Asia Pacific Viewpoint*, 60(3), 325-338.
- [6] ATLAS. (2014). *Disaster and Climate Change Risk Maps and Planning Guide (Sharankhola Upazila)*.
- [7] Auerbach, L. W., Goodbred Jr, S. L., Mondal, D. R., Wilson, C. A., Ahmed, K. R., Roy, K., ... & Ackerly, B. A. (2015). Flood risk of natural and embanked landscapes on the Ganges–Brahmaputra tidal delta plain. *Nature Climate Change*, 5(2), 153-157.
- [8] Azad, A. K., Lin, C. K., & Jensen, K. R. (2007). Wild shrimp larvae harvesting in the coastal zone of Bangladesh: socio-economic perspectives. *Asian Fisheries Science*, 20(3/4), 339.
- [9] Bangladesh Bureau of Statistics (2011): *Household Income and Expenditure Survey 2010*; Bangladesh Bureau of Statistics, Government of Bangladesh: Dhaka, Bangladesh, 2011.
- [10] Bangladesh Bureau of Statistics (BBS). *Yearbook of Agricultural Statistics (2010–2012)*; Statistics and Informatics Division (SID), Ministry of Planning, Government of the People’s Republic of Bangladesh: Dhaka, Bangladesh. Available online: <http://www.bbs.gov.bd>
- [11] Bangladesh Population Census 2001, Bangladesh Bureau of Statistics; Cultural survey report of Sarankhola Upazila 2007.
- [12] BBS (2013). *District statistics 2011*, Dhaka. Dhaka: Bangladesh Bureau of Statistics, Statistics and Informatics Division, Ministry of Planning, The Government of People’s Republic of Bangladesh.
- [13] Black, R., Kniveton, D., & Schmidt-Verkerk, K. (2011). Migration and climate change: towards an integrated assessment of sensitivity. *Environment and Planning A*, 43(2), 431-450.
- [14] Brammer, H. (2014). Bangladesh’s dynamic coastal regions and sea-level rise. *Climate Risk Management*, 1, 51-62.
- [15] Cameron, L., & Shah, M. (2015). Risk-taking behavior in the wake of natural disasters. *Journal of Human Resources*, 50(2), 484-515.
- [16] Connell, J. H. (1978). Diversity in tropical rain forests and coral reefs. *Science*, 199(4335), 1302-1310.
- [17] Drabo, A., & Mbaye, L. M. (2011). Climate change, natural disasters and migration: An empirical analysis in developing countries (IZA Discussion Papers 5927). Bonn: Institute for the Study of Labor (IZA).
- [18] Falguni, A. (2009). Aila after Sidr. *The Daily Star online news*. Dhaka, Bangladesh.
- [19] Garschagen, M., Hagenlocher, M., Comes, M., Dubbert, M., Sabelfeld, R., Lee, Y. J., ... & Pott, S. (2016). *World risk report 2016*.
- [20] Garschagen, M., Hagenlocher, M., Comes, M., Dubbert, M., Sabelfeld, R., Lee, Y. J., ... & Pott, S. (2016). *World risk report 2016*.
- [21] Germanwatch. (2021, January). *GLOBAL CLIMATE RISK INDEX 2021*. Germanwatche.v. <https://germanwatch.org/en/19777>

- [22] Germanwctch. (2019, January). GLOBAL CLIMATE RISK INDEX 2021. Germanwatche.V. <https://reliefweb.int/report/world/global-climate-risk-index2021#:~:text=The%20Global%20Climate%20Risk%20Index%20indicates%20a%20level%20of%20exposure,severe%20events%20in%20the%20future.>
- [23] Habib, W., &Molla, M (2017). Adult literacy rate hits 12-year high. The Daily Star online news. Dhaka, Bangladesh.
- [24] Hagman, G., Beer, H., Bendz, M., &Wijkman, A. (1984). Prevention better than cure. Report on human and environmental disasters in the Third World. 2.
- [25] Ho`st, M., B. Regnell, and P. Runeson. 2006. To complete the degree project (Attgenomf`raexamensarbete). Lund: Studentlitteratur (in Swedish).
- [26] Hoque, S. (2014). Study of adaptation measures practiced in coastal areas of Bangladesh in response to sea level rise.
- [27] Hossain, M. A., Reza, M. I., Rahman, S., &Kayes, I. (2012). Climate change and its impacts on the livelihoods of the vulnerable people in the southwestern coastal zone in Bangladesh. In Climate change and the sustainable use of water resources (pp. 237-259). Springer, Berlin, Heidelberg.
- [28] Hossain, M. N., & Paul, S. K. (2018). Vulnerability factors and effectiveness of disaster mitigation measures in the Bangladesh coast. *Earth Systems and Environment*, 2(1), 55-65.
- [29] Islam, M. M. (2012). Coastal forest rehabilitation and management in Bangladesh. Retrieved July, 11.
- [30] Islam, M. R., &Shamsuddoha, M. (2017). Socioeconomic consequences of climate induced human displacement and migration in Bangladesh. *International Sociology*, 32(3), 277-298.
- [31] Islam, R. (2006). Pre-and post-tsunami coastal planning and land-use policies and issues in Bangladesh.
- [32] King, D., D. Bird, K. Haynes et al. (2014) Voluntary relocation as an adaptation strategy to extreme weather events, *International Journal of Disaster Risk Reduction* 8: 83–90. <https://doi.org/10.1016/j.ijdr.2014.02.006>
- [33] Krantz, M. (1999). Coastal erosion on the island of Bhola, Bangladesh. SWEDMAR.
- [34] Laczko, F., &Aghazarm, C. (2009). Migration, Environment and Climate Change: assessing the evidence. International Organization for Migration (IOM).
- [35] Lee, E. S. (1966). A theory of migration. *Demography*, 3(1), 47-57.
- [36] Ljungberg, A., & Wier, M. (2012). A study of reasons for living in the high-risk community Old Coronation in South Africa. LUTVDG/TVBB.
- [37] Longhurst, R. (2003). Semi-structured interviews and focus groups. *Key methods in geography*, 3(2), 143-156.
- [38] Maferethane, O. I. (2013). The role of indigenous knowledge in disaster risk reduction: A critical analysis (Doctoral dissertation, North-West University).
- [39] Mallick, B. (2014). Cyclone-induced migration in southwest coastal Bangladesh. *ASIEN*, 130, 60-81.
- [40] Mallick, B. (2014). Der gesellschaftlicheUmgangmitzunehmenderVerwundbarkeit: Eine Analyse der sozialenBedingungen für vulnerabilitätsorientierteräumlichePlanung in den Küstenzonen von Bangladesch (Vol. 36). KIT Scientific Publishing.
- [41] Mallick, B. and J. Vogt (2014) Population displacement after cyclone and its consequences: Empirical evidence from coastal Bangladesh, *Journal of the International Society or the Prevention and Mitigation of Natural Hazards* 73 (2): 191–212.
- [42] Mallick, B., Ahmed, B., & Vogt, J. (2017). Living with the risks of cyclone disasters in the south-western coastal region of Bangladesh. *Environments*, 4(1), 13.
- [43] Martin, M., Billah, M., Siddiqui, T., Black, R., &Kniveton, D. (2013). Policy analysis: Climate change and migration Bangladesh. Dhaka, Bangladesh: Refugee and Migratory Movements Research Unit (RMMRU).
- [44] Miah, M. G. (Dec 2009). Impacts of Anthropogenic Activities on Natural Resources and Food Security in the Coastal. Dhaka: The National Food Policy Capacity Strengthening Programme.
- [45] Minar, M. H., Hossain, M. B., & Shamsuddin, M. D. (2013). Climate change and coastal zone of Bangladesh: vulnerability, resilience and adaptability. *Middle-East Journal of Scientific Research*, 13(1), 114-120.
- [46] Ministry of Environment and Forests. (2009, September). Bangladesh Climate Change Strategy and Action Plan 2008. Ministry of Environment and Forests; Government of the People's Republic of Bangladesh. <https://moef.gov.bd/>
- [47] Niskala, V., & Gustafsson, N. (2013). Why do people live in high-risk rural areas?—A study of Tubu, Botswana. LUTVDG/TVBB.

- [48] Parvin, A., A.F.M.A. Alam and R. Asad (2016) A built environment perspective on adaptation in urban informal settlements, Khulna, Bangladesh, in M. Roy, S. Cawood and M. Hordijk (eds.), *Urban poverty and climate change: Life in the slums of Asia, Africa and Latin America*, pp. 73–91. London and New York: Routledge.
- [49] Paul, B., & Rashid, H. (2016). *Climatic Hazards in Coastal Bangladesh: Non-Structural and Structural Solutions*. Butterworth-Heinemann.
- [50] Perch-Nielsen, S. (2004). *Understanding the effect of climate change on human migration: The contribution of mathematical and conceptual models* (Master's thesis, Swiss Federal Institute of Technology, Department of Environmental Sciences).
- [51] Pervin, M. (2013). *Mainstreaming climate change resilience into development planning in Bangladesh*. Climate Change: Country Report.
- [52] Pope, C., Ziebland, S., & Mays, N. (2000). Qualitative research in health care: Analysing qualitative data. *BMJ: British Medical Journal*, 320(7227), 114.
- [53] Sarker, M. N. I., Wu, M., Alam, G. M., & Shouse, R. C. (2020). Livelihood diversification in rural Bangladesh: Patterns and determinants in disaster prone riverine islands. *Land use policy*, 96, 104720.
- [54] Shahid, S. (2010). Probable impacts of climate change on public health in Bangladesh. *Asia Pacific Journal of Public Health*, 22(3), 310-319.
- [55] Sheikh, M. R., & Akter, T. (2017). An Assessment of Climate Change Impacts on Livelihood Patterns: A Case Study at Bakergonj Upazila, Barisal. *Journal of Health and Environmental Research*, 3(3), 42-50.
- [56] Sohel, K. (2014). Bangladesh 3rd poorest country in South Asia. The Dhaka Tribune online news. Dhaka, Bangladesh.
- [57] Solutions, D. (2012). Climate displacement in Bangladesh. Op. cit.
- [58] Stern, N., & Stern, N. H. (2007). *The economics of climate change: the Stern review*. Cambridge University press.
- [59] Torikul, M. H., Farjana, S., & Mujtaba, S. M. (2015). Climate change, natural disaster and vulnerability to occupational changes in coastal region of Bangladesh. *J Geogr Nat Disast*, 5(134), 2167-0587.
- [60] Torikul, M. H., Farjana, S., & Mujtaba, S. M. (2015). Climate Change, Natural Disaster and Vulnerability to Occupational Changes in Coastal Region of Bangladesh. *J Geogr Nat Disast*, 5(134), 2167-0587.
- [61] Tuswadi, & Takehiro, H. (2016, May). School-community collaboration in disaster education in a primary school near Merapi volcano in Java Island. In *AIP Conference Proceedings* (Vol. 1730, No. 1, p. 090001). AIP Publishing LLC.
- [62] UNEP (2001) Bangladesh state of the environment. United Nations Development Programmes (UNEP), Thailand.
- [63] UNICEF. (2000). *Let's learn to prevent disasters!: Fun ways kids to joining in risks reduction: Riskland*. In *Let's learn to prevent disasters!: Fun ways kids to joining in risks reduction: Riskland*. UN. International Strategy for Disaster Reduction (ISDR); UNICEF.
- [64] Water Aid. (2012, December). *Handbook: Climate Change and Disaster Resilient Water, Sanitation and Hygiene Practices*. WaterAid in Bangladesh.
- [65] Yamane, Taro. (1967). *Statistics: An Introductory Analysis*, 2nd Edition, New York: Harper and Row.

Citation: *Tanmoy Malaker et al. "Reason Behind Living in a Disaster-Prone Coastal Region: A case study on Sarankhola Upazila, Bangladesh" International Journal of Humanities Social Sciences and Education (IJHSSE), vol 9, no. 7, 2022, pp.1-15. DOI: <https://doi.org/10.20431/2349-0381.0907001>.*

Copyright: © 2022 Authors. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.