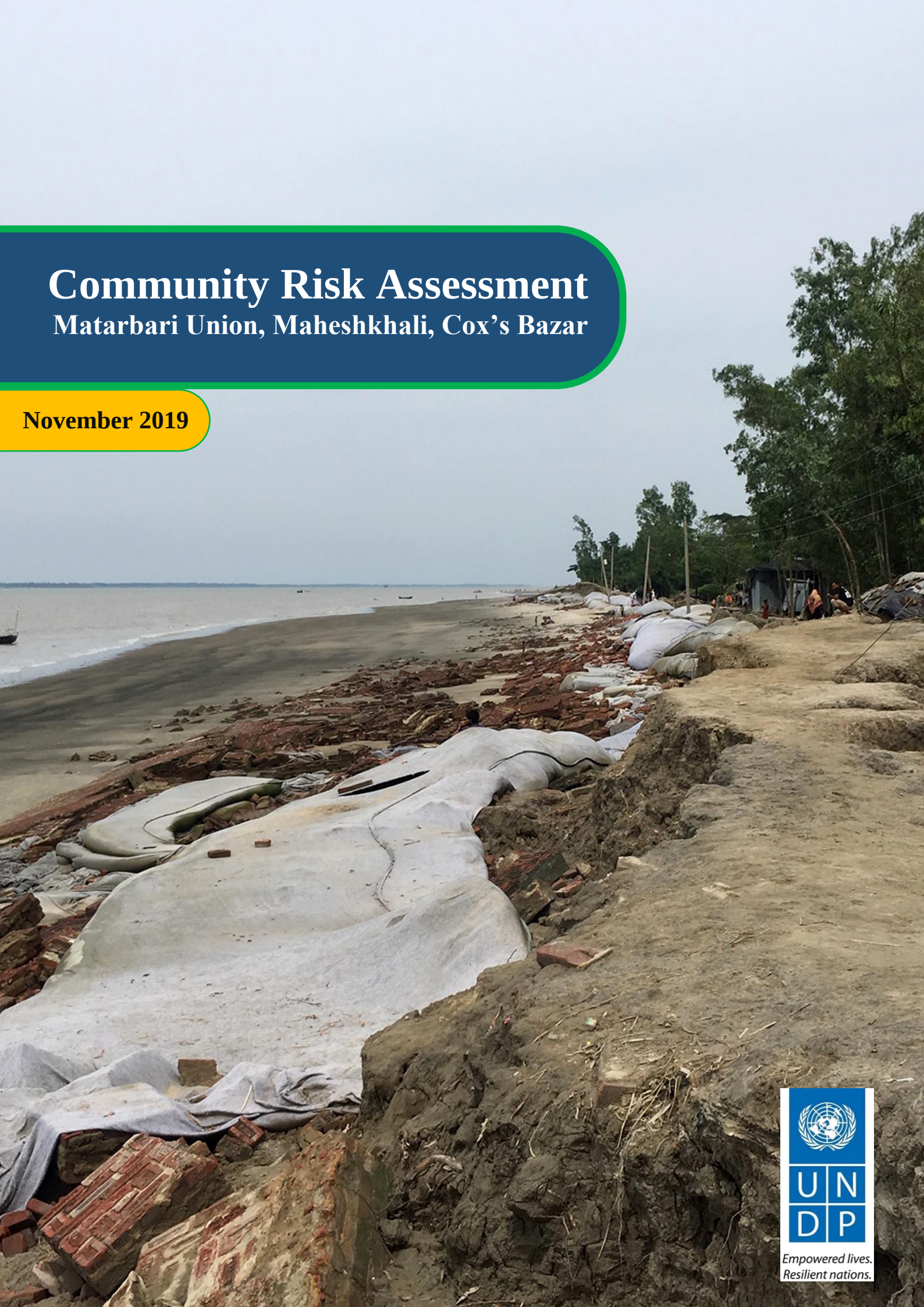
Community Risk Assessment

Matarbari Union, Maheshkhali, Cox's Bazar

November 2019



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Chapter 1. Introduction

A community risk assessment (CRA) is a fundamental step for informing development measures based on local risk dynamics with a view to ensuring the sustainability of interventions and service delivery programs. The main purpose of a CRA is to enable local communities to be at the forefront of risk and vulnerability identification. This is achieved through local communities performing the risk assessment processes themselves resulting in a framework for a mutual exchange of information and strategies between key service providers, development practitioners and local community members.

Matarbari Union is located the inner coastal area of Bangladesh with exposure to different types of natural and anthropogenic hazards. The union has a long history of experiencing devastation from natural disasters, including Cyclone Gorky in 1991 along with being frequently affected by cyclones, tidal floods, erosion, and waterlogging. The union was selected for a CRA after it was identified by the district administration as a high-risk area facing multiple socioeconomic problems. The objective was to determine the elements at risk of natural hazards and to inform a risk reduction strategy.

CRA is a methodology that has been specifically designed to engage communities in disaster risk reduction and adaptation. In this study, we have followed the Community Risk Assessment Guideline developed by the Comprehensive Disaster Management Programme (CDMP). It provides insight into how local risks are generated and how they can be reduced. It is an approach that aims to empower the community concerned by involving them in defining problems, decision-making, implementation of appropriate activities and evaluation of results and interventions. It acknowledges that risk reduction efforts will vary from one community to another because of unique geophysical, historical and socioeconomic conditions. Risk assessment is a process that can be effectively employed to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that could potentially threaten or cause harm to people, property, livelihoods and environment.

Community risk assessment generally involves three key phases:

- Preparatory groundwork to determine the risk context and pre-CRA mapping;

- A field-based CRA in collaboration with the community;
- Generation of risk information in a report to inform appropriate solutions both for short term interventions as well as longer-term integrated disaster risk reduction planning.

1.1. Short history of Matarbari Union

Maheshkhali is an Upazila of Cox's Bazar District in the Division of Chittagong, Bangladesh. Maheshkhali Upazila (Cox's Bazar District) has an area of 362.18 km^2 and is bounded by Chakaria Upazila to the north, Cox's Bazar Sadar Upazila and the Bay of Bengal to the south, Chakaria and Cox's Bazar Sadar Upazilas to the east and Kutubdia Upazila and the Bay of Bengal to the west (UP, 2019). The main rivers in Maheshkhali Upazila are the Bakkhali River and the Maheshkhali Channel. The administration of Maheshkhali Thana was turned into a upazila in 1982. It consists of 12 union parishads, 25 mouzas and 170 villages. Maheshkhali municipality consists of 9 words with an area of 7.68 km^2 The municipality has a population of 35000 people, wherein 20370 are male and 14630 are female (source: http://moheshkhali.coxsbazar.gov.bd/site/page/8cc9e615-2144-11e7-8f57-286ed488c766/এক%20নজরে%20পৌরসভা). The literacy rate among the municipality people is 43.7% (BBS, 2011). Maheshkhali is the only hilly island in Bangladesh, with diversified geomorphological characteristics. Having both a coastal area and a hilly area makes this union as a hub for natural resources and tourism. Among the twelve unions of Maheshkhali, the Matarbari Union is isolated from the mainland by the Kuheliya river.

Base Map: Matarbari Union, Maheshkhili Upazila, Cox's Bazar

Figure 1: Base map, Matarbari Union

Matarbari Union located in the north-western part of Maheshkhali Upazila. The Matarbari and Dhalgata unions are isolated from the Maheshkhali mainland by the Kuheliya River and are connected by the bridge at Matarbari point. As an inner coastal union, Matarbari is highly exposed to hydro-meteorological and geological hazards, such as tsunamis. The long-term impacts of climate change and extreme climatic events make the area even more vulnerable to natural hazards. With abrupt natural phenomena, anthropogenic factors make this union vulnerable to human-induced hazards.

Due to its geophysical location, the Matarbari Union is highly exposed to cyclones, strom-surges, salinity intrusion and riverbank/coastline erosion as well as present development projects triggering exposure of waterlogging. In this union shrimp farming, salt cultivation, fishing and day labor are the main sources of livelihoods. The natural resources are exposed and highly sensitive to natural hazards and climate change. Local livelihoods have been affected by a loss of traditional jobs (such as shrimp farming and salt cultivation) through the acquisition of land for development. While some have found work in construction of a power plant, these are short-term unskilled day labor jobs. Livelihood insecurity increases residents' financial vulnerability to natural disasters and reduces capacity for adaptation and mitigation.

1.2. Demographic information

Kuheliya River is going by on the east side of Matarbari union, on north side Uzantiya River is passing by and on the west, there is the Bay of Bengal. Matarbari union is an island especially. Canal Rangakhali is passing through this union.

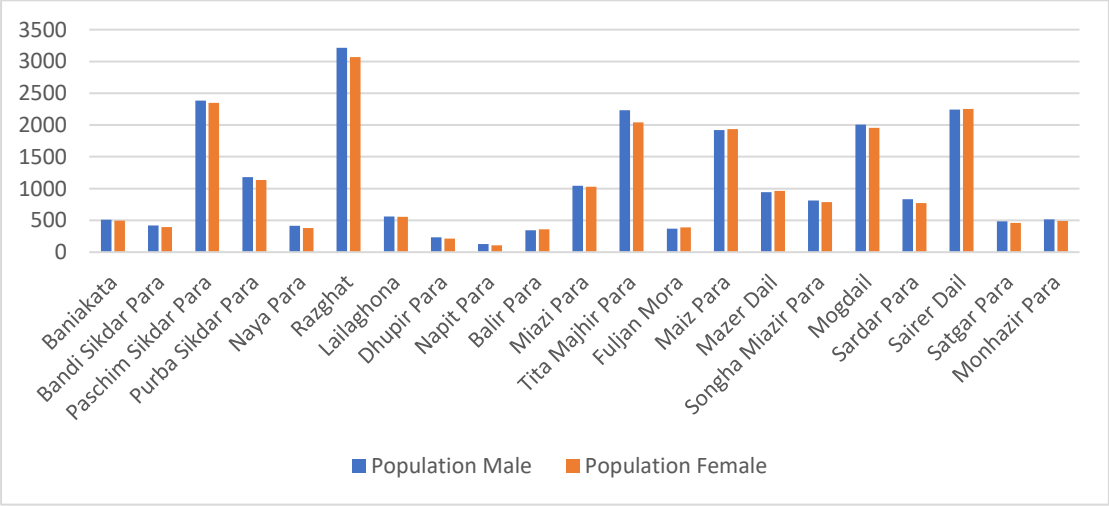


Figure 2: Population size of different villages of Matarbari ((BBS, 2011)

Figure 2 represents the population of males and females living in the paras within the Matarbari Union. Rajghat has the highest population in comparison to other paras in the union. Following Rajghat, Paschim Sikder Para, Tita Majhir Para, Maize Para, Mogdail, Sairardail are also higher populated areas in the union. A closer look at the graph can conclude that male-female balance is quite stable in all areas. Most settlements are on the slope of embankments (Field Survey, 2019).

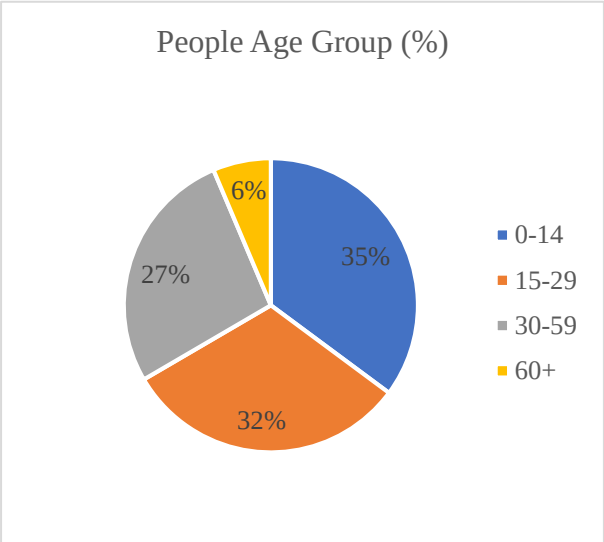


Figure 3: Population by age group (BBS, 2011)

According to BBS survey 2011 there is a large workforce in Matarbari with 32% of the population aged between 15 to 29 years of age and 27% of the population aged between 30 to 59 years of age (Figure 3) (BBS, 2011).

1.3. Socio-economic conditions in the union

Based on economic status, 40% of the population of Matarbari Union are extremely poor, 50% are poor, 6% are middle class and 4% are wealthy (BBS, 2011). Livelihood opportunities are shrinking day by day due to climate change uncertainties, natural disasters and the anthropogenic intervention by the government and local people. The reason behind the large portion of poverty may be frequent hazard and extreme weather eventss and abrupt climate conditions in the union. Frequent cyclones and tidal floods cause severe damage to agriculture. As the main occupations of residents are farming and fishing, damage to these sectors cause a negative impact on household regional economies. For example, the average wage of a male day laborer is 400 takas but during a hazardouse periods (such as after a cyclone or during the monsoon) the wage can be reduced to 300 takas (Field Survey, 2019).

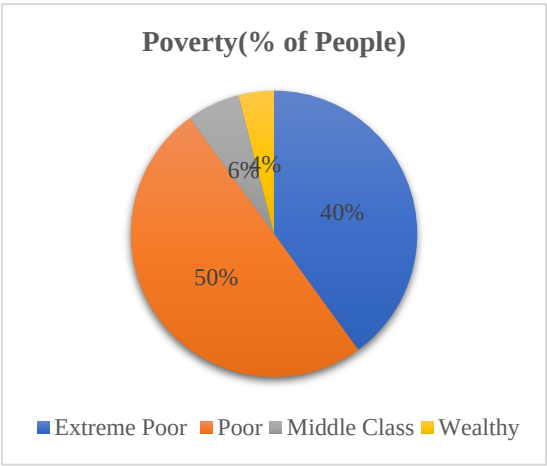


Figure 4: Economic status (BBS, 2011)

Therefore, the union economy is severely impacted by the effects of frequent extreme weather and seasonal variations. According to the local people, the government has allocated 1400 acres of land in the southern part of Matarbari and 1100 acres of land in the northern part of the union for the construction of two coal-based power plants.

Matarbari is highly exposed due to its location on the Bay of Bengal with livelihoods dependent on nature and the sea. About 100% of day labors is male and the fishing community boys work with their family member in the fishing boat (Field Survey, 2019). Therefore, the effect of livelihood dependency makes a significant impact on the literacy rate. As seen in Figure 5, the female literacy rate is 29.4% and the male literacy rate is 26.1% (BBS, 2011).

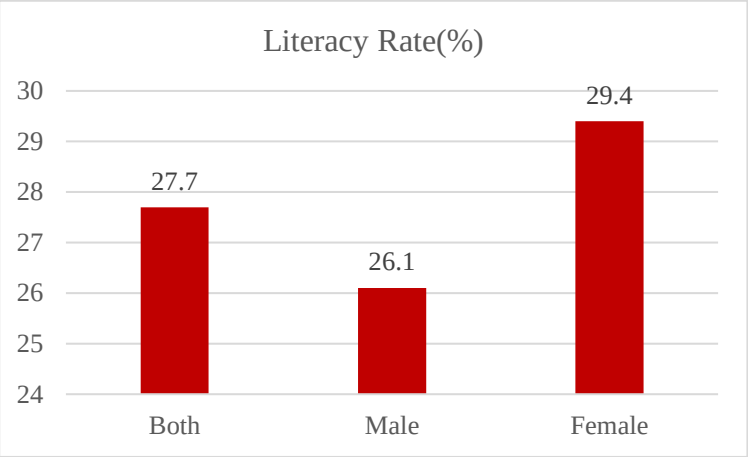


Figure 5: Literacy rate (%) (BBS, 2011)

The people of Matarbari living with disaster, disaster and climate change make financially vulnerable and the higher poverty rate. Therefore, the people do not set up the sanitary latrine, 56% of people use Non-sanitary toilet facilities, and the rest of 44% use sanitary toilet facilities (Figure 6) (BBS, 2011). Most of the case people are not aware of the sanitary system also the consecutive disaster damages their toilet so that they are not interested in setup the sanitary toilet.

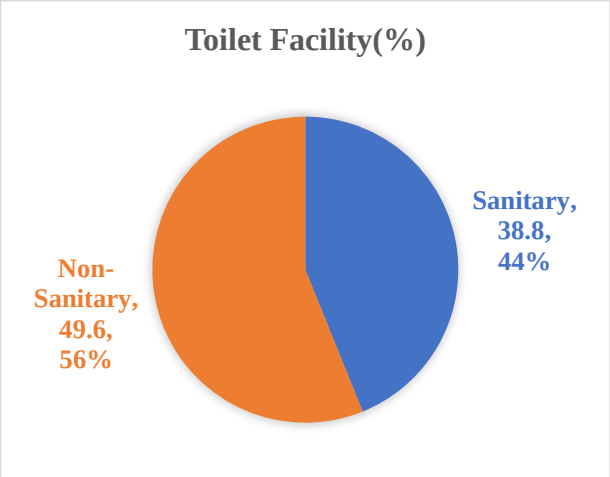


Figure 6: Toilet facility (%) (BBS, 2011)

The natural disaster and extreme climate events make its footprint everywhere. The household structure is one of the significant indicators of the household type. According to the BBS-2011 survey data in this union only 9.2% of houses are pucca/semi-pucca rest 91.8% of houses are katch (BBS, 2011). From the economic status, we have seen about 90% of people are extremely poor and poor. The poor people are living in front of the disaster and they are the most affected community.

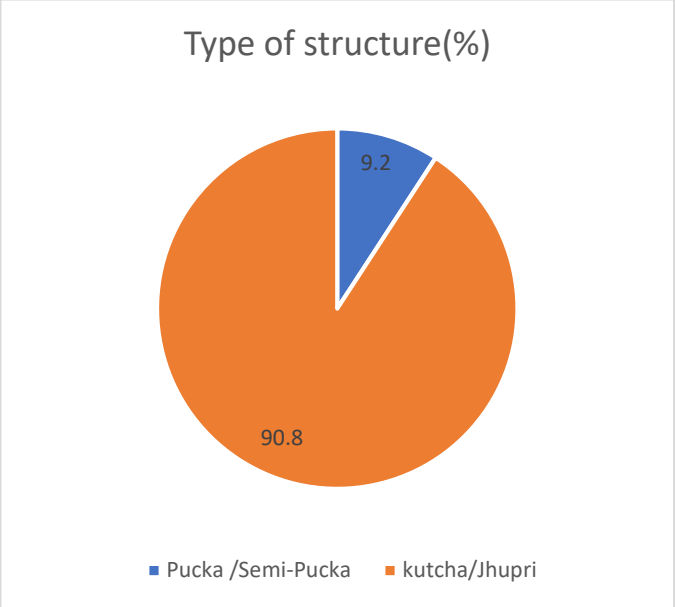


Figure 7: Type of structure (%) (BBS, 2011)

The sources of drinking water. 95% of the people of the union use shallow tube well as their main source of drinking water. And 5% of the people collect their drinking water from other sources like pond and streams (BBS, 2011).

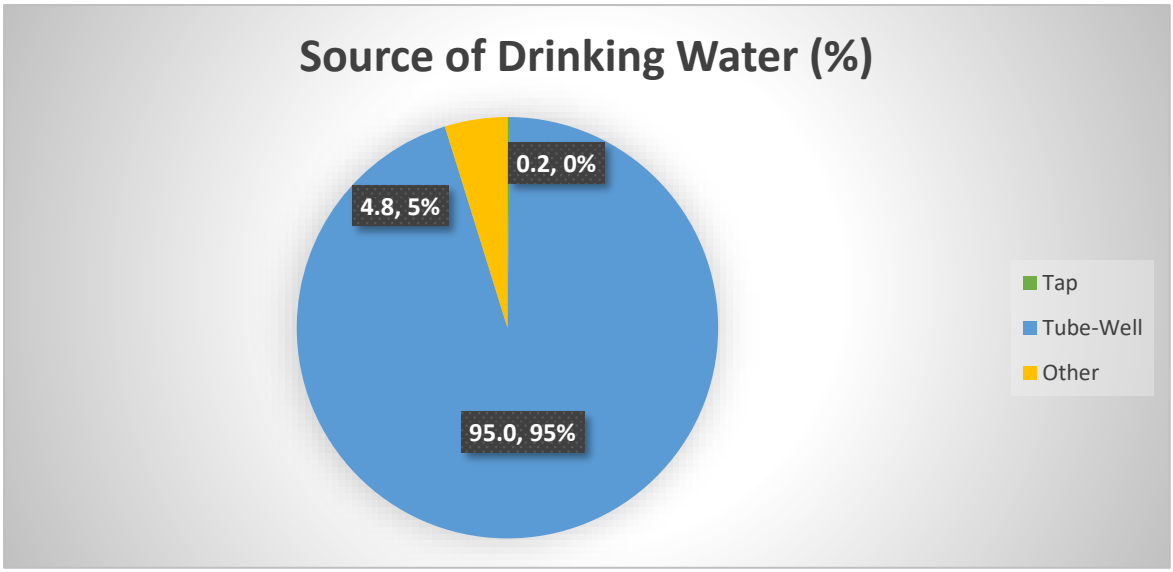


Figure 8: Source of drinking water in different villages of Matarbari Union (%) (BBS, 2011)

The source of livelihoods is shrinking day by day due to climate change uncertainties, natural disaster and the anthropogenic intervention by the Government and the Local

people. Frequent cyclone, tidal flood causes severe damage to agriculture. As the source of livelihoods people are depending on agriculture, shrimp culture and salt cultivation which are highly vulnerable to natural hazards and have a negative impact on their life and livelihoods.

At present the densely populated Matarbari Island on the southeast coast of Bangladesh, just north of the town of Cox's Bazar, was selected as the site for two major projects, one consisting of two 600MW coal-fired power stations, the other two-700MW plants. With these power plants, there are several economic activities. With these power plants, there are several economic activities around the Maheshkhali. Bangladesh Economic Zone Authority (BEZA) has proposed the acquisition of 19-thousand-acre land for the development project. Among these, land half of the land for BEZA and another half of the land for the other four government organizations for the construction of coal power plant and LNG terminal. However, local people say that BEZA already acquisition more than 27 thousand-acre lands. Due to some geophysical facilities, the development projects are shifted to the Maheshkhali, among the geophysical location the draft for large ship movement found near about Maheshkhali. That is the reasoned the Prime Minister's Office is overseeing large-scale developments in Matarbari and Maheshkhali and positioning these places as hubs of power generation and economic activity(Japan International Cooperation Agency(JICA), 2018).

1.4. Local resources

Matarbari union has many elements exposed to different types of hazards throughout the whole year. The elements can be classified into broader classes i.e. Physical Elements, Natural Elements and Institutional Elements. Among the physical elements, there are Primary Schools, Health Centers, Mosque, Cemetery, Community Clinics, Police Camp, Organizations, Offices, Orphanage, Jeti Ghat, Madrassa, Cyclone Centre, etc. Transport sectors include roads (paved roads, unpaved roads) These elements are highly exposed to the cyclone, storm surge, tidal flood, riverbank erosion and waterlogging.

The union is located in the nearshore area so the hydrological and Meteorological hazards have higher exposure and these elements were affected by the different types of natural hazards in recent years. Ongoing development projects are making a new

exposure like waterlogging and only one canal which is only one outlet for the rainwater which was closed and silted up. The people were experienced severe waterlogging.

Natural elements include river Kuheliya that is vulnerable to riverbank erosion and siltation. Siltation may work as a catalyst of the overflow of river water and ultimately waterlogging in residential areas. Also, the high-volume devolvement work needed the land reclamation and the land reclamation process doesn't follow the proper methodology that's why the river Kuheliya were rapidly silted up and lose its function. In the low tide, the Kuheliya river hasn't any flow for operating the Rajghat jetty (Field Survey, 2019).

Chapter 2. Local hazards and vulnerabilities

2.1. Historical analysis of hazards

In Bangladesh, southern coastal are frequently exposed to heavy monsoon rains and cyclones. In 1991, Category 4 storm with a maximum wind speed of 193 km/h tore through south eastern coast line Bangladesh killing over 140,000 people and leaving 10 million without a source of income(B.K. Paul, Rashid, Islam and Hunt, 2010). The cyclone was one of the most severe storms that hit Bangladesh in the 20th century and more than 10 million people were homeless. With 6m surge height, the Gorky has affected the districts of Chittagong, Cox's Bazaar, Feni, Lakhimpur, Noakhali, Bhola, Barisal, Patuakhali, Barguna. Although 2 million people were evacuated from the coastal areas, the death toll was high, since most of the residents of Chittagong did not know the impending cyclone (B.K. Paul, Rashid, Islam and Hunt, 2010). Three to four weeks after the storm dissipated, massive erosion of the land led to the loss of agricultural land and unemployment. The Maheshkhali is one of the most devastating area where the two coastal unions Matarbari and Dhalghata were severely affected in 1991(B.K. Paul, Rashid, Islam and Hunt, 2010).

The major hazards in Matarbari union area cyclone, storm surge, waterlogging and tidal flooding. The nine wards of Matarbari union were affected due to the cyclones of 1991, 1997, 2016 and 2017(Chowdhury, Bhuyia, Choudhury, & Sen, 1993; B. K. Paul et al., 2010; S. K. Paul, 2011). Cyclones caused huge damage to the physical elements of all the wards. Especially ward 6, 7 and 8 had an effect severely damage to the physical elements due to cyclone and storm surge. Water logging is an all-yearlong hazard for this union. Waterlogging causes disruption of communication and damage to the physical structures. Due to the damping by water, the physical structure loses their strength and get more vulnerable to cyclones and storm surges. Though the union hasn’t any experience such a severe level waterlogging due to development work.

The Matarbari union are facing extreme water logging condition due to present development work. In the hazard map of the Matarbari union we have seen that the western coastline is the highly erosion-prone area and the eastern Kuheliya riverbank also vulnerable to erosion. The central part of the ward no 1,2,3 are waterlogged due to

the shutdown of the sluice gate on the mouth of the Rangakhali cannel (Field Survey, 2019). For Matarbari power plant project work several sluice gates had been closed for land reclamation without creating the alternative outlet. Thus why these unexpected waterlogging situations happened.

Hazard Map: Matarbari Union, Maheshkhili Upazila, Cox's Bazar

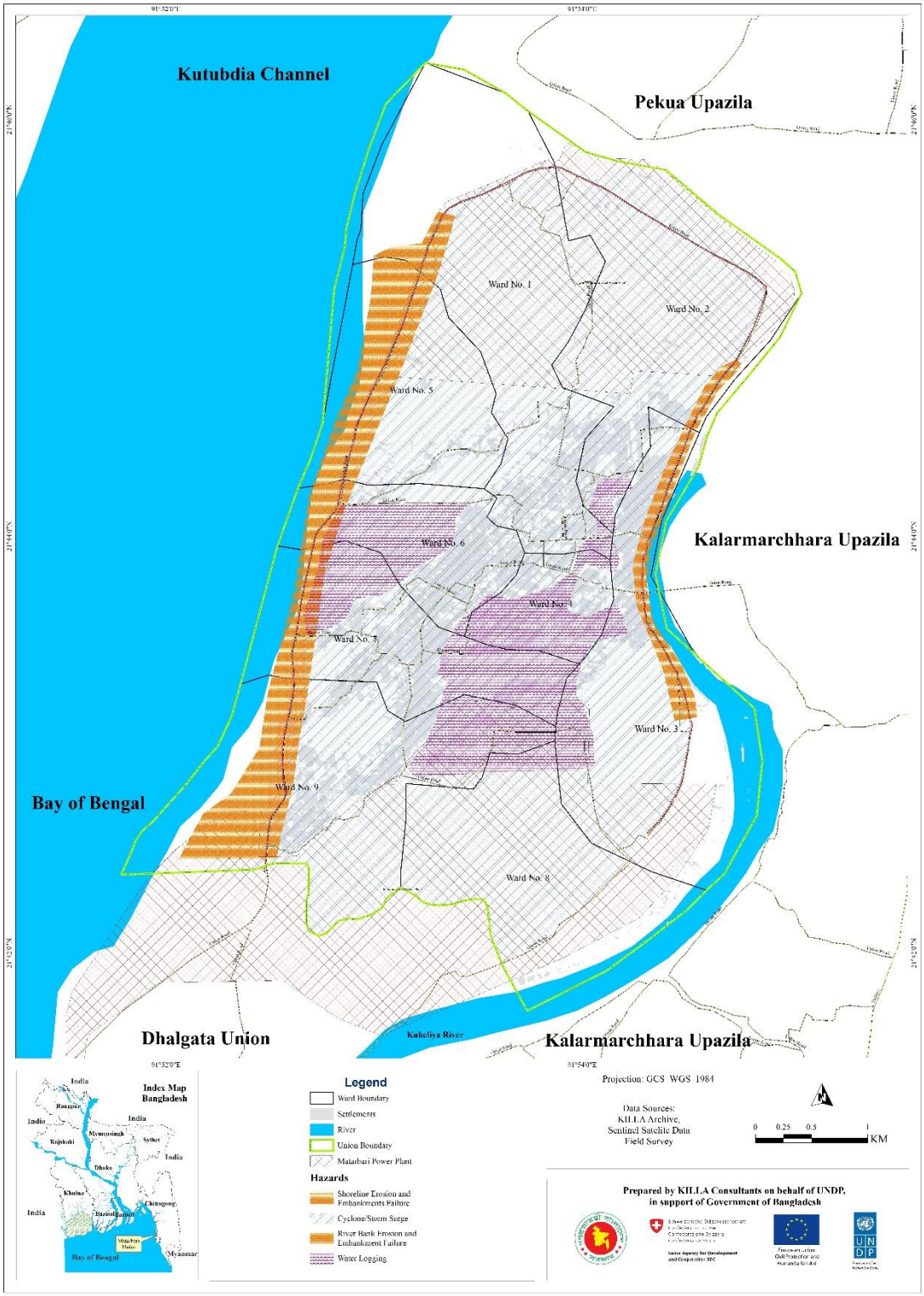


Figure 9: Hazard map of Matarbari Union

The Matarbari is a low-lying area the average surface elevation not more than 3 m but some places elevation is lower than Mean Sea Level (MSL). That is why the storm surges and tidal effect is much higher. When tidal surge or storm surge pass over the union the lower surface roughness in the salt field the water velocity does not decrease. The Figure-10 to Figure 13 shown the frequency analysis of different return periods and different parameter. Figure 10 shoes the maximum water surface elevation distribution for 50-year storm surge and 20-year flood, according to the frequency modeled the water height about 4 in the Matarbari Union for 50-year return period Storm Surge and 20-year return period flood. For the 100-year return period Storm Surge and 50-year return period Flood events, the water height was increased to 7 m (Figure-11). On the other hand, the inundation height for 100-year return period storm surge and 20-year return period flood is about 4-6 meter in different places of the Matarbari union (Figure-12). Though most of the area of Matarbari union elevation below the Mean Sea Level (MSL) and the surface roughness is very low so some of the cases the inundation height much higher than the model represents. Due to low elevation and low surface roughness, the water will be flow over the land for 100-year return period storm surge and 20-year return periods flood (Japan International Cooperation Agency (JICA), 2018).

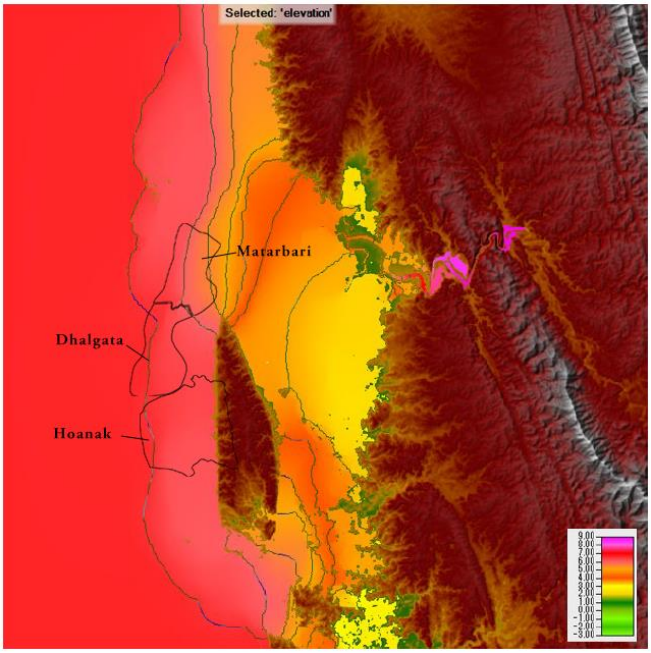


Figure 10: Maximum water surface elevation distribution (50-year storm surge + 20-year flood) (Japan International Cooperation Agency (JICA), 2018)

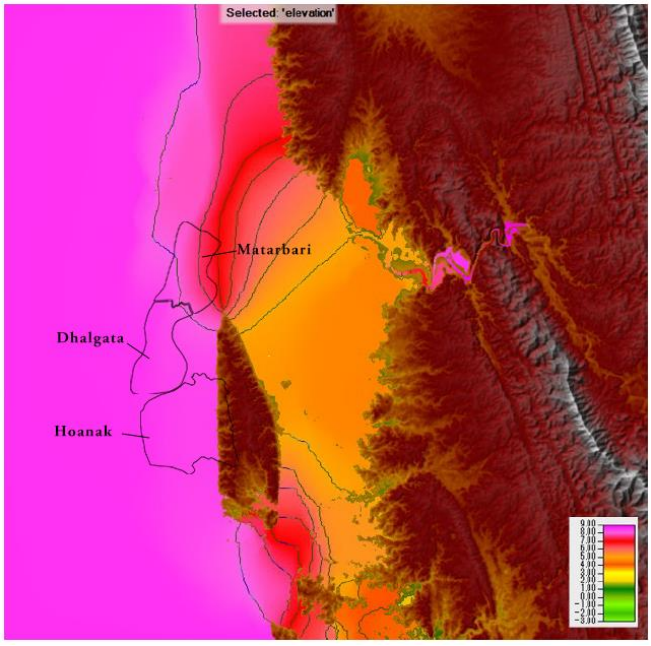


Figure 11: Maximum water surface elevation distribution (100-year storm surge + 20-year flood) (JICA, 2018)

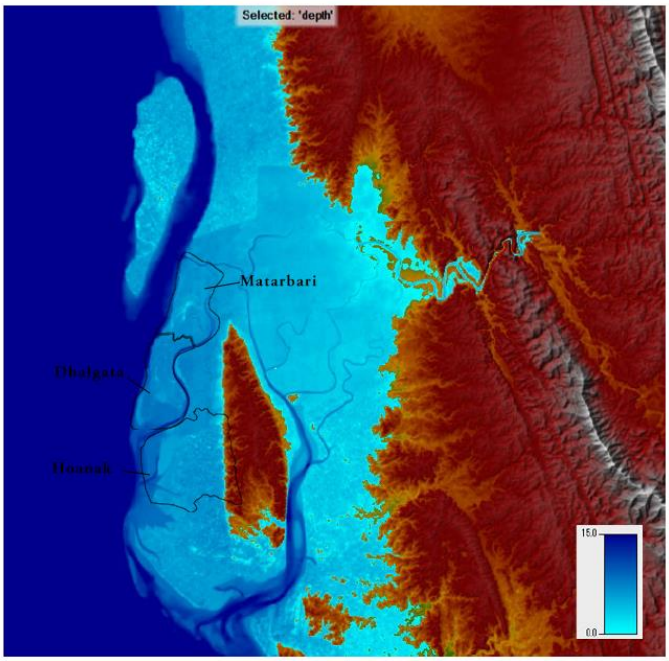


Figure 12: Distribution of maximum inundation height (100-year storm surge + 20-year flood) (JICA, 2018)

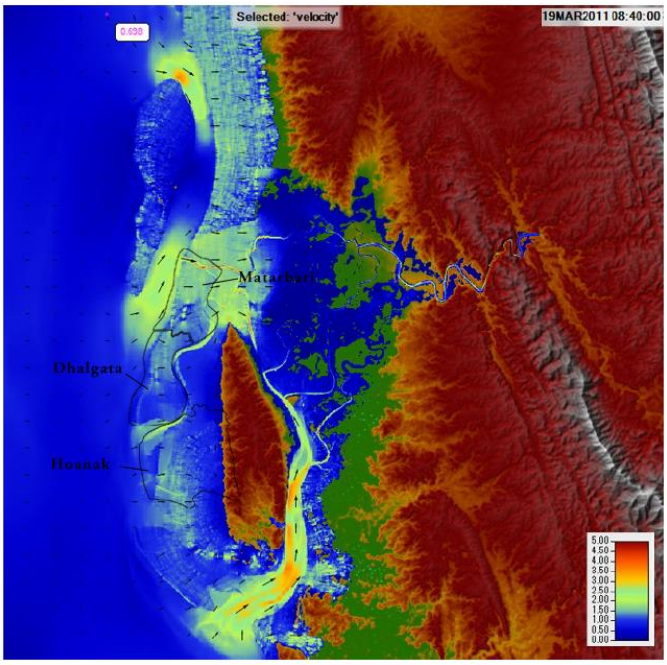


Figure 13:Flow velocity / velocity-vector distribution (100-year storm surge + 20-year flood) (JICA, 2018)

2.2. Hazard venn and calendar / seasonality

Historically Matarbari Union faces different types of natural disasters. A complex geophysical setting with its socio-political phenomenon makes this union more and more vulnerable. Matarbari is one of the highest devastating areas in cyclone Gorky 1991(Chowdhury et al., 1993; B. K. Paul et al., 2010). As an inner coastal area, the highest level of exposure and intensity of different types of natural disasters and extreme climate events. According to the people of the Matarbari union, the major hazards are Cyclone, Storm surges, Waterlogging, riverbank/shoreline erosion. Historically cyclone/storm surges have the highest intensity and frequency but due to

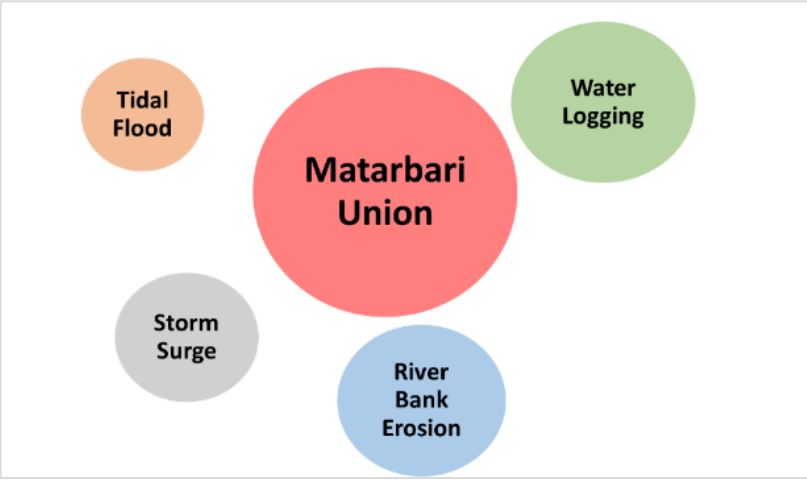


Figure 14: Hazard venn (Field Survey, 2019)

development work (Matarbari Power Plant), most of the sluice gates are closed for that reason thee Rangakhali Cannel loss its follow and carrying capacity (Field Survey, 2019). Therefore, water logging is one of the major with its highest frequency and intensity. The union is surrounded by the river and sea, as a result of the strong wave the shoreline/coastline erosion is predominate and eastern side the bank of Kuheliya River is higher intensity and frequency. Among the hazard's cyclones occurs mainly from Baishak (Mid April) to Srabon (Mid July), Waterlogging is all year long hazard, but mainly dominant during Jaishtha (Mid May) to Magh (Mid January). Storm surge occurs during monsoon from Jaishtha (Mid May) to Srabon (Mid July). River Bank erosion is also an all-yearlong hazard due to close proximity to the river Kuheliya.

Table 1: Hazard calendar of Matarbari Union (Field Survey, 2019)

Hazard	Baishak		Jaishtha		Ashar		Srabon		Vadra		Ashin		Kartrik		Agrahayon		Poush		Magh		Falgun		Chaitra	
	Mid-April	Mid-May	Mid-May	Mid-June	Mid-June	Mid-July	Mid-July	Mid-August	Mid-August	Mid-September	Mid-September	Mid-October	Mid-October	Mid-November	Mid-November	Mid-December	Mid-December	Mid-January	Mid-January	Mid-February	Mid-February	Mid-March	Mid-March	Mid-April
Cyclone																								
Storm Surge																								
Riverbank erosion																								
Water Logging																								
Tidal Flood																								

2.3. Crop seasonality and exposure to hazards

Crop seasonality is broadly classified in three classes depending on the cropping patterns i.e. Rabi Crop (October – March), Kharip -1 (March – July), Kharip -2 (July – October).

Rabi and Kharip 2 crops include BR 28, BR 32, BR 39, BR 49, BR 50. During Kharip 1, lands are submerged due to tidal flooding and farmers then cultivate salt and shrimp. If we compare the hazard calendar and the crop calendar then we can nature that the exposure of the hazards for a crop. In the Matarbari union, the salt field is used for shrimp farming in the rainy season and this land is the double cropland. So, most of the hydrological hazards are occur in the rainy season that is the reason the paddy field and shrimp have been affected by the storm surge and tidal surge. Some meteorological hazards are created exposure for the salt field in the dry periods. The quality of the salt depends on the natural process so some meteorological phenomenon affects salt production.

Table 2: Seasonal crop pattern (Field Survey, 2019)

Crop Season	Rabi (October – March)	Kharip -1 (March – July)	Kharip -2 (July – October)
Crop Name	BR-28	Shrimp	BR-32
	BR-50	-	BR-28
	BR-49	-	BR-39

2.4. Land use pattern

Before the development projects the lands of the Matarbari union are used for two different agriculture systems one is the dual cropping and another is the multi-cropping land. The southern and northern sides of the union are used for the salt cultivation and shrimp farming. But the protected middle land was used for agricultural practices. This middle land covers 45% of total agricultural land. Among these agricultural lands there are 20% tri-crop land, 20% double-crop land and 5% single cropland. There are large scale development works are

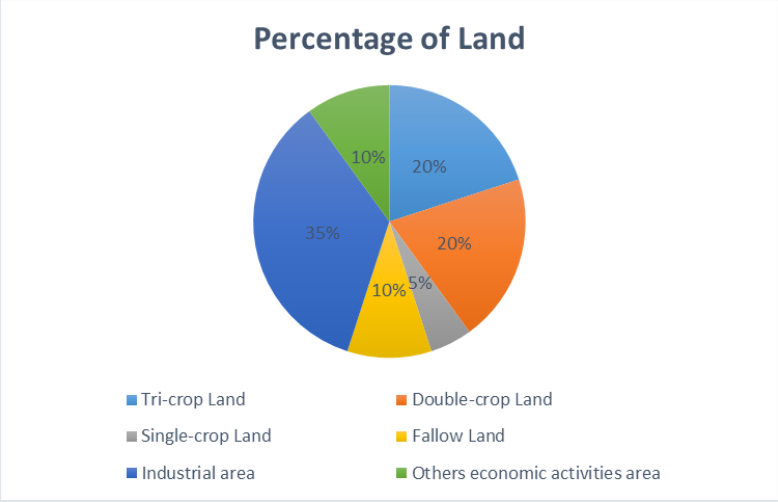


Figure 15: Agricultural landusetType (%) (Field Survey, 2019)

ongoing in this union and this development work covers all of the salt fields of this union. According to the time-series satellite imagery analysis, settlement and agricultural lands are found in the middle portion of the union and increasing in recent years. There was significant erosion are occurs on the west coast in this union.

Landuse Map: Matarbari Union, Maheshkhali Upazila, Cox's Bazar

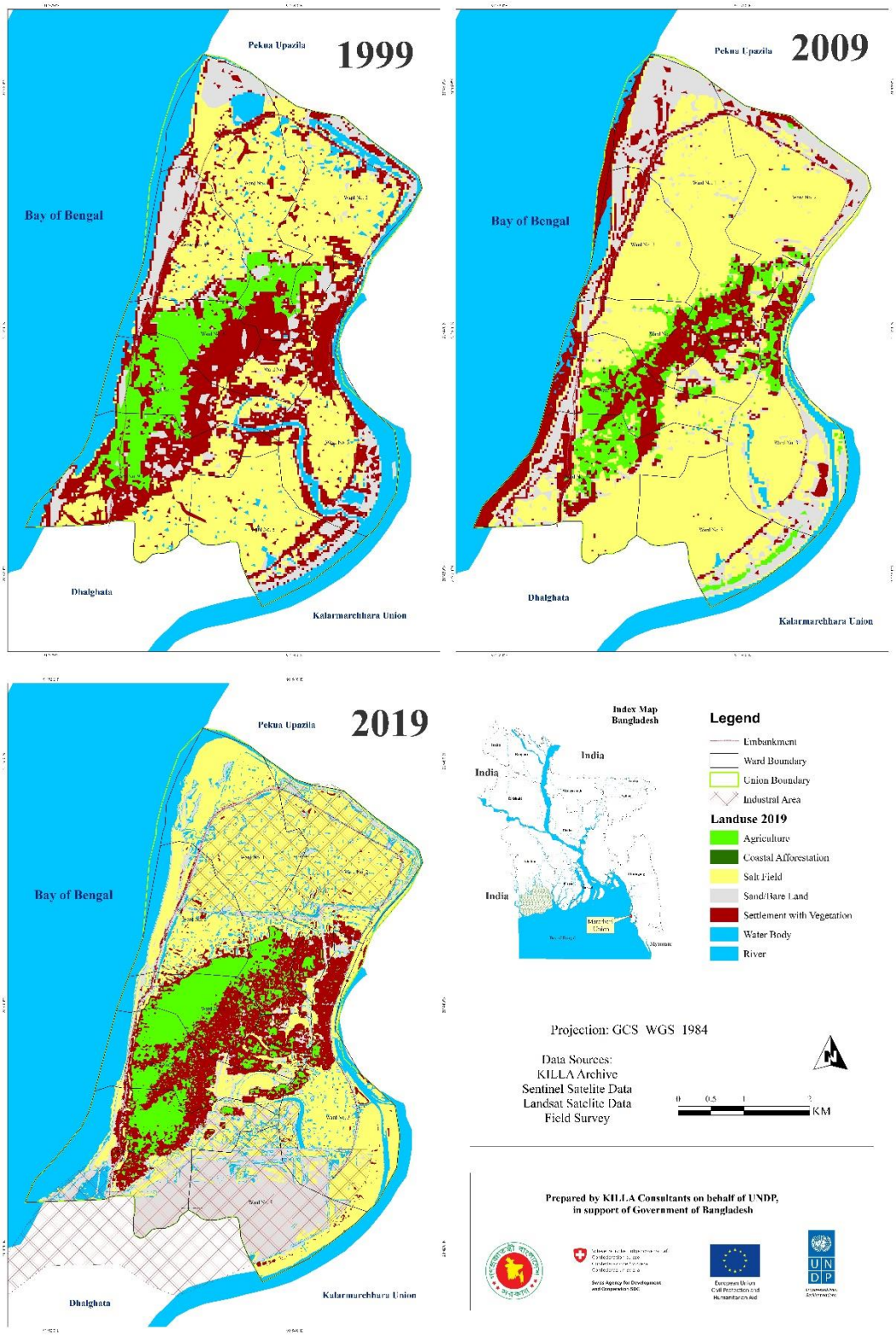


Figure 16: Landuse map

2.5. Livelihood options and vulnerability

In Matarbari Union, around 10% of people are involved in farming and their major vulnerabilities are cyclone and storm surge(Field Survey). Farmers are also victim of low wages and poor availability of good quality seeds. Storm surge and cyclone affect farmers severely. As cyclone early warning is still not in place properly, farmers are not able to tackle the impact. As a result, their crops are damaged. Farmers are also worried about land reclamation due to power plant projects in this union.

Around 10% of people are involved in fisheries. They have to face problems due to tidal floods. Around 10% of people of this union are day laborers and their main vulnerability is job security and scarcity during hazard seasons. During the normal period wage to male day labor in about 600 tk. On the other hand, during the hazard period, the wage of male day labor declined to taka 300 (Field Survey, 2019).

Around 5% of people do business in small and medium enterprises, which often gets affected by poor communication systems, weak market strategy and inaccessibility of goods. (Field Survey, 2019) They have to take a loan to run their families in the time of natural calamities. Due to waterlogging, they fail to transport their goods and products, products are damped due to water. Customers also do not come to the market during the disaster thus business gets hampered.

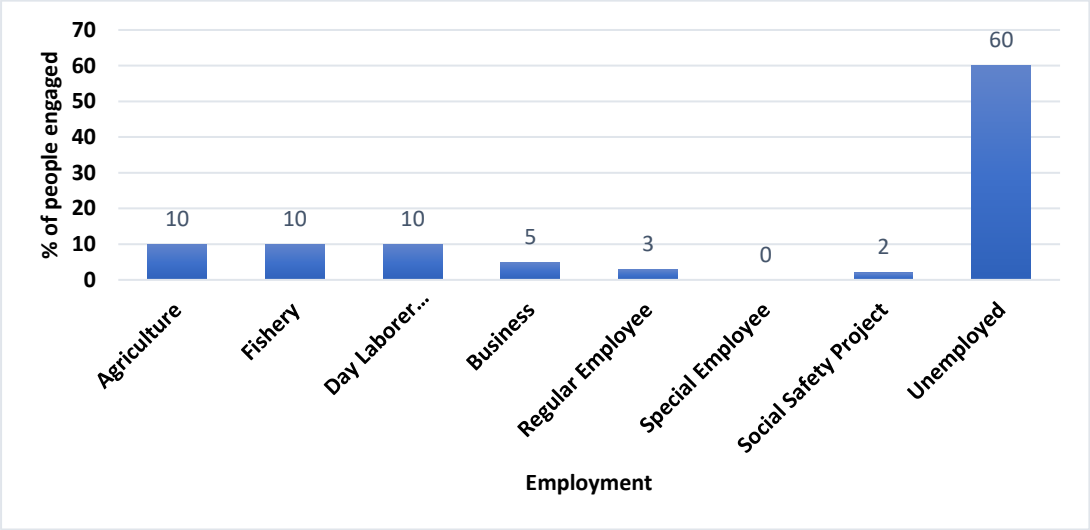


Figure 17: Types of employment (Field Survey, 2019)

Around 3% of people are involved in services either permanent or temporary. Permanent service holders face the problem of low wages, poor accessible facilities during hazard days. Temporary service holders face job insecurity during the emergency period. People of this union are not related to the social safety net program. Around 60% of the people in this union are unemployed (Field Survey, 2019). The reason behind the unemployment is lack of skill, lack of job opportunity, lack of willingness, lack of interest in education, the economic instability of family.

2.6. Vulnerability of population and local economy to climatic hazards

Male, female, and children everyone is vulnerable to hazards but their vulnerability level id different. Male is vulnerable to climatic hazards due to lack of skill, laziness, and illiteracy. Females are more vulnerable in comparison to males. Their physical weakness, lack of skill, tendency to stay in houses, physical attire like wearing saree. make them more vulnerable. Children are always vulnerable to climatic hazards due to physical weakness and lack of coping capacities to hazards. Disabled persons are most vulnerable to climatic hazards due to their inability to operate by themselves alone.

In the local economy, major vulnerable sectors are farming, fishing, day laboring. Farmers are vulnerable due to lack of knowledge about coping with climatic hazards. Most of the farmers are ignorant about the changing pattern of climatic hazards. Due to economic instability, they hardly can use resilient and water and saline tolerant variety seeds that can sustain during extreme climatic conditions. Fishermen are vulnerable to storm surges and cyclone as most of them have to stay on the sea during the sudden extreme climate. Many of them have no communication system due to the inability to access. Due to land reclamation by the Power Plant project, salt producers and shrimp cultivators are worried about their future. Day laborers are dependent on others due to lack of employment opportunities.

Chapter 3. Community risks and vulnerability

3.1. Sector-wise risks and consequences

Matarbari union has many elements exposed to different types of hazards throughout the whole year. The elements can be classified into broader classes i.e. Physical Elements, Crops, Livestock and Fisheries, Land, Transport. Among the physical elements, there are primary schools, colleges, hospitals, mosque, temple, grave yard, community clinics, shelter, organizations, offices, mills and industries, tube wells, latrines, other educational institutes, madrassa and households. Transport sectors include roads, embankment, bridges. These elements are highly exposed to the cyclone, storm surge, water logging and riverbank erosion.

The physical elements e.g. schools, madrassa, cemetery, health complex. in ward 1,2,3 is about likely to damage due to cyclone, flood and water logging. In the ward 4,5,6 physical elements are about likely to be damaged due to cyclone and water logging. In the ward 7, 8, 9 elements are about almost certain to be damaged by cyclones, tidal surge and riverbank erosion and likely due to water logging.

Earthen roads are about highly vulnerable to surge and water logging, they may go underwater and soil may be eroded. Water logging causes damping to roads, it causes cavities in the roads and disrupts the smooth communication. Embankment is damaged, soil from the sides of the embankment is eroded and collapse due to tidal flood. Schools are about vulnerable to water logging, cyclone and surge; school building may be damaged, classrooms may get flooded, school-going children face the problem, the whole education system is disrupted. Schools are also susceptible to riverbank erosion and cause erosion of building structures and soil of the school. The mosques and temples are vulnerable to cyclones and water logging. Regular prayer routine is disrupted due to flood and flash flood.

Crops are vulnerable to the cyclone and tidal surge. Shrimp cultivation and salt production are one of the major sources of livelihood. They are highly vulnerable to cyclones, water logging and surge. As 10% of people are day laborer their vulnerability to climatic hazards are supreme (Field Survey, 2019). During hazard season there is a scarcity of employment and people have to sit idle.

3.2. Risk statement with high priority risk

Elements	Risk statement	Consequence	Rank (Risk)
Embankment	The Embankment of the west coastline (Noya para to Sairardail) was damaged severely by recent erosion and tidal surge. If erosion and cyclone like Gorky continue in next some years by this river, the embankment will be severely damaged and more than 5000 will be affected.	Loss of life and livelihoods Damage crops and households Disrupt the sanitation and freshwater sources	1
Embankment	The Embankment of the eastern riverbank was damaged severely by recent erosion and tidal surge. If erosion and cyclone like Gorky continue in next some years by this river, the embankment will be severely damaged and more than 5000 will be affected.	Loss of life and livelihoods Damage crops and households Disrupt the sanitation and freshwater sources	2
Canal	The Rangakhali was damaged severely by recent siltation. If heavy rainfall and cyclone like Gorky continue in next some years the river cannot carry water, elements will be severely damaged and more than 5000 will be affected.	Damage Households Disrupt normal livelihoods Communication disruption	3
Road	If cyclone like Gorky, tides, heavy rainfall or water logging occur frequently in this union then the road Hospital to Boshir fakir house (Ward no-1) Hospital to Ideal School (Ward no-1) will be affected severely and more than 2000 people will face the problem to communicate	Communication & transportation system would be seriously disrupted. Loss of livelihoods	4
Culvert	Due to poor structural condition and water pressure this culvert damage almost moderately, if cyclones like Gorky and high tide occur in this ward, the culvert eastern side of the CNG stand will be damaged severely.	Communication & transportation system would be seriously disrupted. Loss of livelihoods	5
Culvert	Due to poor structural condition and water, pressure this culvert damage almost moderately, if cyclone like Gorky and high tide occur in this ward, the culvert eastern side Rajghat Primary school will be damaged severely.	Communication & transportation system would be seriously disrupted. Loss of livelihoods.	6
Culvert	Due to poor structural condition and water pressure this culvert damage almost moderately, if cyclone like Gorky and high tide occur in this ward, the culvert beside Ummehani Balika Madrasah Ward no-9 stands will be damaged severely.	Communication & transportation system would be seriously disrupted. Loss of livelihoods	7
Culvert	Due to poor structural condition and water pressure this culvert damage almost moderately, if cyclones like Gorky and high tide occur in this ward, the culvert west side of the Maizpara ward no-7 will be damaged severely.	Communication & transportation system would be seriously disrupted. Loss of livelihoods	8
Culvert	Due to poor structural condition and water pressure this culvert damage almost moderately, if cyclone like Gorky and high tide occur in this ward, the culvert beside Sagorpar Jamea Mosque ward no-5 stand will be damaged severely.	Communication & transportation system would be seriously disrupted. Loss of livelihoods	9
Road	If cyclone like Gorky, tides, heavy rainfall or water logging occur frequently in this union then Khondar bill to Utter Sikder Bazar (Ward no-2) Altaf Hossain Market to Utter Sikder Para (Ward no -2) will be	Communication & transportation system would be seriously disrupted. Loss of livelihoods.	10

	affected severely and more than 1000 people will face the problem to communicate		
Road	If cyclone like Gorky, tides, heavy rainfall or water logging occur frequently in this union then Utter Rajghat to Rasidiya Madrasah (Ward no -3) Dakshin Rajghat to Fulziramor (Ward no -3) will be affected severely and more than 1000 people will face the problem to communicate	Communication & transportation system would be seriously disrupted. Loss of livelihoods	11
Culvert	Due to poor structure and water pressure this culvert was damaged moderately if cyclones like Gorky and high tide occur the culvert near old bazar will be damaged severely.	Communication & transportation system would be seriously disrupted. Loss of livelihoods	12
Road	If cyclone like Gorky, tides, heavy rainfall or water logging occur frequently in this union Sultana House to Manhazi Para (Ward no -4) Balipara to Shairpara (Ward no -5) Shairpara Road (Ward no -5) will be affected severely and more than 500 people will face the problem to communicate	Communication & transportation system would be seriously disrupted. Loss of livelihoods	13
Road	If cyclones like Gorky, tides, heavy rainfall or water logging occur frequently in this union then Matarbari west para to Noya Para Govt. Primary School (Ward no -7) will be affected severely and more than 2000 people will face the problem to communicate	Communication & transportation system would be seriously disrupted. Loss of livelihoods	14
Road	If cyclone like Gorky, tides, heavy rainfall or water logging occur frequently in this union Hogsho Miyazipara to Mogdailbazar (Ward no -8) will be affected severely and more than 2000 people will face the problem to communicate	Communication & transportation system would be seriously disrupted. Loss of livelihoods	15
Road	If cyclone like Gorky, tides, heavy rainfall or water logging occur frequently in this union Saidail Bazar to Mogdail bazar (Ward no -9) will be affected severely and more than 2000 people will face the problem to communicate	Communication & transportation system would be seriously disrupted. Loss of livelihoods	16
Houses	If cyclone like Gorky, tides, heavy rainfall occur frequently in this area then more than 300 houses in the Sairardail ward no-6 would be severely damaged.	Loss of living places and create insecurity and conflict, social cohesion	17
Sluice gate/ water outlet	Due to power plant development projects the mail outlet of Rangakhali cannel was closed If the new sluice gate does not construct the 50% of people and resources would be affected.	Communication & transportation system would be seriously disrupted. Loss of livelihoods Loss of crop production	18
Houses	If cyclone like Gorky, tides, heavy rainfall occur frequently in this area then more than 100 houses of the Noyapara ward no-7 would be severely damaged.	Loss of living places and create insecurity and conflict, social cohesion Sanitation problem	19
Houses	If cyclone like Gorky, tides, heavy rainfall occur frequently in this area then more than 200 houses in the ward no-9 would be severely damaged.	Loss of living places and create insecurity and conflict, social cohesion Sanitation problem	20
Houses	If cyclone like Gorky, tides, heavy rainfall or water logging occur frequently in this area then more than 400 houses in the Jhilpar road ward no-3 would be severely damaged.	Loss of living places and create insecurity and conflict, social cohesion Sanitation problem	21

3.4. Sensitivity and exposure analysis

Elements	Risk statement	Exposure to hazard	Key components	Sensitivity-1	Sensitivity-2	Sensitivity-3
Embankment	The Embankment of the west coastline (Noya para to Sairardail) was damaged severely by recent erosion and tidal surge. If erosion and cyclone like Gorky continue in next some years by this river, the embankment will be severely damaged and more than 5000 will be affected.	Storm surge Tidal flood	Brick (Slop and toe protection)	Quality	Base materials	Stability
			Soil	Cohesion	Soil type	Soil texture
Embankment	The Embankment of the eastern riverbank was damaged severely by recent erosion and tidal surge. If erosion and cyclone like Gorky continue in next some years by this river, the embankment will be severely damaged and more than 5000 will be affected.	Storm surge Tidal flood	Brick (Slop and toe protection)	Quality	Base materials	Stability
			Soil	Cohesion	Soil type	Soil texture
Canal	The Rangakhali was damaged severely by recent siltation. If heavy rainfall and cyclone like Gorky continue in next some years the river cannot carry water, elements will be severely damaged and more than 5000 will be affected.	Anthropogenic	Morphology	Channel depth	Channel width	
			water	Sediment concentration		
Road	If cyclone like Gorky, tides, heavy rainfall or water logging occur frequently in this union then the road Hospital to Boshir fakir house (Ward no-1) Hospital to Ideal School (Ward no-1) will be affected severely and more than 2000 people will face the problem to communicate	Storm surge Tidal flood Water-logging	Brick (Guide wall)	Quality	Base materials	Stability
			Soil	Cohesion	Soil type	Soil texture
Culvert	Due to poor structural condition and water pressure this culvert damage almost moderately, if cyclone like Gorky and high tide occur in this ward, the culvert eastern side of the CNG stand will be damaged severely.	Storm surge Tidal flood	RCC	Materials	Construction quality	
			Brick	Quality	Base materials	Stability
			Base Soil	Cohesion	Soil type	Soil texture
Culvert	Due to poor structural condition and water, pressure this culvert damage almost moderately, if cyclone like Gorky and high tide occur in this ward, the culvert eastern side Rajghat Primary school will be damaged severely.	Storm surge Tidal flood	RCC	Materials	Construction quality	
			Brick	Quality	Base materials	Stability
			Base soil	Cohesion	Soil type	Soil texture

Culvert	Due to poor structural condition and water pressure this culvert damage almost moderately, if cyclone like Gorky and high tide occur in this ward, the culvert beside Ummehani Balika Madrasah Ward no-9 stand will be damaged severely.	Storm surge Tidal flood	RCC	Materials	Construction quality	
			Brick	Quality	Base materials	Stability
			Base Soil	Cohesion	Soil type	Soil texture
Culvert	Due to poor structural condition and water pressure this culvert damage almost moderately, if cyclone like Gorky and high tide occur in this ward, the culvert west side of the Maizpara ward no-7 will be damaged severely.	Storm surge Tidal flood	RCC	Materials	Construction quality	
			Brick	Quality	Base materials	Stability
			Base soil	Cohesion	Soil type	Soil texture
Culvert	Due to poor structural condition and water pressure this culvert damage almost moderately, if cyclone like Gorky and high tide occur in this ward, the culvert beside Sagorpar Jamea Mosque ward no-5 stand will be damaged severely.	Storm surge Tidal flood	RCC	Materials	Construction quality	
			Brick	Quality	Base materials	Stability
			Base soil	Cohesion	Soil type	Soil texture
Road	If cyclone like Gorky, tides, heavy rainfall or water logging occur frequently in this union then Khondar bill to Utter Sikder Bazar (Ward no-2) Altaf Hossain Market to Utter Sikder Para (Ward no -2) will be affected severely and more than 1000 people will face the problem to communicate	Storm surge Tidal flood	Brick (guide wall)	Quality	Base materials	Stability
			Soil	Cohesion	Soil type	Soil texture
Road	If cyclone like Gorky, tides, heavy rainfall or water logging occur frequently in this union then Utter Rajghat to Rasidiya Madrasah (Ward no -3) Dakshin Rajghat to Fulziramor (Ward no -3) will be affected severely and more than 1000 people will face the problem to communicate	Storm surge Tidal flood	Brick (guide wall)	Quality	Base materials	Stability
			Soil	Cohesion	Soil type	Soil texture
Culvert	Due to poor structure and water pressure this culvert was damaged moderately if cyclone like Gorky and high tide occur the culvert near old bazar will be damaged severely.	Storm surge Tidal flood	RCC	Materials	Construction quality	
			Brick	Quality	Base materials	Stability
			Base soil	Cohesion	Soil type	Soil texture
Road	If cyclone like Gorky, tides, heavy rainfall or water logging occur frequently in this union	Storm surge Tidal flood	Brick (guide wall)	Quality	Base materials	Stability

	Sultana House to Manhazi Para (Ward no -4) Balipara to Shairpara (Ward no -5) Shairpara Road (Ward no -5) will be affected severely and more than 500 people will face the problem to communicate		Soil	Cohesion	Soil type	Soil texture
Road	If cyclone like Gorky, tides, heavy rainfall or water logging occur frequently in this union then Matarbari west para to Noya Para Govt. Primary School (Ward no -7) will be affected severely and more than 2000 people will face the problem to communicate	Storm surge Tidal flood	Brick (guide wall)	Quality	Base materials	Stability
			Soil	Cohesion	Soil type	Soil texture
Road	If cyclone like Gorky, tides, heavy rainfall or water logging occur frequently in this union Hogsho Miyazipara to Mogdail bazar (Ward no -8) will be affected severely and more than 2000 people will face the problem to communicate	Storm surge Tidal flood	Brick (guide wall)	Quality	Base materials	Stability
			Soil	Cohesion	Soil type	Soil texture
Road	If cyclone like Gorky, tides, heavy rainfall or water logging occur frequently in this union Saidail Bazar to Mogdail bazar (Ward no -9) will be affected severely and more than 2000 people will face the problem to communicate	Storm surge Tidal flood	Brick (guide wall)	Quality	Base materials	Stability
			Soil	Cohesion	Soil type	Soil texture
Houses	If cyclone like Gorky, tides, heavy rainfall occur frequently in this area then more than 300 houses in the Sairardail ward no-6 would be severely damaged.	Storm surge Tidal flood	Furniture	Highly sensitive to water	Perishable	Storage environment
			Wood	Highly sensitive to water	Less strength	
			Mud	Easily eroded	Less shear strength	
			Plastic sheet	Easily damaged by sun and high-water pressure	Durability	
			Sn sheet	Highly sensitive to water	Highly corrosion prone	
Sluice Gate/ Water Outlet	Due to power plant development projects the mail outlet of Rangakhali cannel was closed If the new sluice gate does not construct the 50% of people and resources would be affected.	Storm surge Tidal flood	RCC	Materials	Construction quality	
			Brick	Quality	Base materials	Stability
			Base soil	Cohesion	Soil type	Soil texture

Houses	If cyclone like Gorky, tides, heavy rainfall occur frequently in this area then more than 100 houses of the Noyapara ward no-7 would be severely damaged.	Cyclone Storm surge Tidal flood Water-logging	Furniture	Highly sensitive to water	Perishable	Storage environment
			Wood	Highly sensitive to water	Less strength	
			Mud	Easily eroded	Less shear strength	
			Plastic sheet	Easily damaged by sun and high-water pressure	Durability	
			Sn sheet	Highly sensitive to water	Highly corrosion prone	
Houses	If cyclone like Gorky, tides, heavy rainfall occur frequently in this area then more than 200 houses in the ward no-9 would be severely damaged.	Cyclone Storm surge Tidal flood Water-logging	Furniture	Highly sensitive to water	Perishable	Storage Environment
			Wood	Highly sensitive to water	Less strength	
			Mud	Easily eroded	Less shear strength	
			Plastic sheet	Easily damaged by sun and high-water pressure	Durability	
			Sn sheet	Highly sensitive to water	Highly corrosion prone	
Houses	If cyclone like Gorky, tides, heavy rainfall or water logging occur frequently in this area then more than 400 houses in the Jhilpar road ward no-3 would be severely damaged.	Cyclone Storm surge Tidal flood Water-logging	Furniture	Highly sensitive to water	Perishable	Storage environment
			Wood	Highly sensitive to water	Less strength	
			Mud	Easily eroded	Less shear strength	
			Plastic sheet	Easily damaged by sun and high-water pressure	Durability	
			Sn Sheet	Highly sensitive to water	Highly corrosion prone	

3.5. Adaptive capacity

Based on the socioeconomic conditions of the people of the Matarbari union have taken some adaptive measures against extreme climate events and natural disasters. The people of this union mostly used indigenous practices but with the help of different

NGOs, INGOs, Development Partners and govt. some scientific knowledge-based intervention has been placed. Sluice gates have been installed to manage the entrance of water into the crop fields. The structural elements like schools, housing is being built with strong infrastructural materials. Embankments are being repaired by their own efforts. In the union level, they have not any financial capacity to install the new knowledge, skills and technology-based adaptation strategy. The human resources of the union are limited and they have not any technical skills and knowledge to implement the Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) strategy. To ensure the DRR and CCA the union have been needed a new financial system and financial organization. The houses in the slop of the embankments are built by local materials and local knowledge. Here people use the plastic sheet for roof and the plastic sheet is the very light and can't tolerate the coastal wind pressure so people make a thin soil cover top of the plastic sheet and plant grass that will provide natural temperature control and increase the durability of the roof also protect against the wind pressure.

Chapter 4. Risk reduction options and action plan

4.1. Risk reduction option

To reduce the sensitivity and exposure several risk reduction options can be taken. To reduce the exposure of agriculture from the cyclone and tidal flooding, short-duration crops can be cultivated. To reduce the impact of salinity, salinity tolerant crops like BRRI 40, 41, 47 can be encouraged. Saline water tolerant fish and crab cultivation can be encouraged. High yield floodwater resilient crop variety seeds can be given to farmers at a low price so that they feel encouraged. Improved early warning information can be provided to farmers so that they can prepare themselves.

To reduce the exposure of roads, culvert and bridges from storm surge and waterlogging, height can be increased from historical flood level so that they are not inundated. River dredging can be performed on a routine basis. Tree can be planted on both sides of culvert and bridges to reduce soil erosion. Embankments on both sides of rivers can be installed to reduce the impact of flooding. Excavation of canals should be done.

Physical infrastructure like schools, houses, offices, and mosques can be built on elevated land. Shelters can be built to protect people from emergency situations. Shelters should be multipurpose so that they can be used as a school or health center during normal days. Protection walls should be built around the infrastructure to protect from surge water. Good building material must be used in the construction, the floor must be covered with concrete and tree plantation on open places around the physical elements must be followed. Important places e.g. markets, cemeteries, crematories should be surrounded by guide wall or revetment if necessary. Tube wells should be on a high platform so that the water does not get contaminated during flood periods. Sanitary latrines should also be on high platforms.

Special concern about women, elders and children should be kept in mind while constructing a shelter. Moreover, installing a community-based early warning system can reduce the risks. Risk transfer mechanisms for life, assets and livelihood should be introduced.

The activities are given below:

1. Embankment Construction and Repair
2. Construction of the Sluice gate
3. Dredging the Rangakhali Khal/Cannel
4. Increase the height of Village Road
5. Relocation of the Households
6. Increase the Height of road
7. Repair and Reconstruction of the Road
8. Alternative source of Livelihoods
9. Saline tolerate crop variety

4.1. Risk reduction action plan

No	Activities	Who	When	How	Where	Approximate Cost	Other Consideration
1	Embankment Construction and Repair	BWDB, LGED, UNDP	2019-2020	Participation with local People Ensure Slope and Toe Protection	From Sairardail to Northside of Noya para, shoreline Embankments.		Labour force must be collected from local
2	Embankment Construction and Repair	BWDB, LGED, UNDP	2019-2020	Participation with local People Ensure Slope and Toe Protection	From the south side of Rajghat to Northside of North Raj Ghat		Labour force must be collected from local
3	Canal Dredging	UP, BWDB, UNDP, JAICA, NGOs, MoDMR	2019-2020	Ensure the convince capacity of the canal to carry out 100y 3-hour rainfall	Rangakhali Canal		Labour force must be collected from local
4	Sluice Gate Construction	BWDB, UP, BWDB, UNDP, JAICA, MoDMR	2019-2020	Ensure the convince Capacity of the flood flow.	The mouth of Rangakhali Canal		Ensure
5	Household Relocation (500)	UP, LGED, Govt./Non-Govt. Organization, UNDP	2019-2021	Construction some cluster village in the less vulnerable lands and ensure sustainability.	Noyapara and Sairardail Ward no 6, 7, &9, These settlements are located outside of the embankment of the shoreline.		Ensure the security of the ownership and source of livelihoods.
6	Repairing of the Road	UP, LGED, Govt./Non-Govt. Organization, UNDP	2019-2020	Use local labor, locally available soil and other materials. Ensure sustainability.	Hospital to Boshir fakir house (Ward no-1) Hospital to Ideal School (Ward no-1)		Labour force must be collected from local people. Use locally available construction materials.

	Repairing of the Road	UP, LGED, Govt./Non-Govt. Organization, UNDP	2019-2020	Use local labor, locally available soil and other materials. Ensure sustainability.	Khondar bill to Utter Sikder Bazar (Ward no-2) Altaf Hossain Market to Utter Sikder Para (Ward no -2)		Labour force must be collected from local people. Use locally available construction materials.
	Repairing of the Road	UP, LGED, Govt./Non-Govt. Organization, UNDP	2019-2020	Use local labor, locally available soil and other materials. Ensure sustainability.	Utter Rajghat to Rasidiya Madrasah (Ward no -3)		Labour force must be collected from local people. Use locally available construction materials.
	Repairing of the Road	UP, LGED, Govt./Non-Govt. Organization, UNDP	2019-2020	Use local labor, locally available soil and other materials. Ensure sustainability.	Dakshin Rajghat to Fulziramor (Ward no -3)		Labour force must be collected from local people. Use locally available construction materials.
	Repairing of the Road	UP, LGED, Govt./Non-Govt. Organization, UNDP	2019-2020	Use local labor, locally available soil and other materials. Ensure sustainability.	Sultana House to Manhazi Para (Ward no -4)		Labour force must be collected from local people. Use locally available construction materials.
	Repairing of the Road	UP, LGED, Govt./Non-Govt. Organization, UNDP	2019-2020	Use local labor, locally available soil and other materials. Ensure sustainability.	Balipara to Shairpara (Ward no -5)		Labour force must be collected from local people. Use locally available construction materials.
	Repairing of the Road	UP, LGED, Govt./Non-Govt. Organization, UNDP	2019-2020	Use local labor, locally available soil and other materials. Ensure sustainability.	Matarbari west para to Noya Para Govt. Primary School (Ward no -7)		Labour force must be collected from local people. Use locally available construction materials.

	Repairing of the Road	UP, LGED, Govt./Non-Govt. Organization, UNDP	2019-2020	Use local labor, locally available soil and other materials. Ensure sustainability.	Hogsho Miyazipara to Mogdailbazar (Ward no -8)		Labour force must be collected from local people. Use locally available construction materials.
	Repairing of the Road	UP, LGED, Govt./Non-Govt. Organization, UNDP	2019-2020	Use local labor, locally available soil and other materials. Ensure sustainability.	Saidail Bazar to Mogdail bazar (Ward no -9)		Labour force must be collected from local people. Use locally available construction materials.
	Reconstruction of the Road	UP, LGED, Govt./Non-Govt. Organization, UNDP	2019-2020	Use local labor , locally available soil and other materials. Ensure sustainability.	Shairpara Road (Ward no -5)		Labour force must be collected from local people. Use locally available construction materials.
	Reconstruction of the Road	UP, LGED, Govt./Non-Govt. Organization, UNDP	2019-2022	Use local labor, locally available soil and other materials. Ensure sustainability.	Puran(old) Bazar to Fulziramor (Ward no -6)		Labour force must be collected from local people. Use locally available construction materials.
7	Saline Tolerate Variety	UP, DPHE, Upazila Parishad, NGO, UNDP	2019-2023	The saline tolerant verity ensures the benefits of the agriculture dependent community and provide training and information about the saline tolerant rice variety.	Among the agriculture dependent community.		Ensure the seeding and harvesting periods have not exposure.
8	Alternative Livelihoods sources	UP, JAICA, NGO	2019-2025	Provide some technical training that they can work in the power plant and other development activities.	The most vulnerable community living the shoreline of Ward no -6,7&9		Ensure the participation of the unskilled labour force

*UP - Union Parshad

*NGO – Non-Government Organization

*UNDP – United Nations Development Programme

*UPz – Upazila Parishad

*JICA – Japan International Corporation Agency

*BWDB – Bangladesh Water Development Board

*LGED – Local Government Engineering Department

*MoDMR – Ministry of Disaster Management and Relief

Chapter 5. Conclusion

Conducting a CRA in vulnerable areas with high risks can be very informative and beneficial to community members, local stakeholders and local government. Through writing a detailed investigation of the highly vulnerable Matarbari Union, the community members are now provided with information they themselves have compiled about the risk of the cyclone, storm surge, coastal flooding and waterlogging. The research conducted was participatory in design, incorporating community members into the research team, thus providing primary information gathered in the field with people who actually live with this risk.

According to the local people, key informants, and respective govt. organization and other stakeholders, this union is most vulnerable to the cyclone, storm surge, tidal flood, waterlogging. Moreover, the magnitude of those hazards become greater because of the poor maintenance of embankments and its geographic location. Therefore, due to recent development projects, the main canal of this union was blocked and the long-term waterlogging situation created. In addition, the poor infrastructure and build structure in vulnerable places make the resources more and more vulnerable. The main protection embankment was damaged by high tidal current and flood this year so the exposure of the tidal flood increased. In short, long-term planning and studies can make development works more fruitful in the future.

Chapter 6. References

Chowdhury, A. M. R., Bhuyia, A. U., Choudhury, A. Y., & Sen, R. (1993). The Bangladesh Cyclone of 1991: Why So Many People Died. *Disasters*. https://doi.org/10.1111/j.1467-7717.1993.tb00503.x

Japan International Cooperation Agency(JICA). (2018). *Final Report Preparatory Survey on Matarbari Port Development Project in the People's Republic of Bangladesh*.

Paul, B. K., Rashid, H., Islam, M. S., & Hunt, L. M. (2010). Cyclone evacuation in

bangladesh: Tropical cyclones gorky (1991) vs. sidr (2007). *Environmental Hazards*. https://doi.org/10.3763/ehaz.2010.SI04

Paul, S. K. (2011). Determinants of Evacuation Response To Cyclone Warning in Coastal Areas of Bangladesh : a Comparative Study. *Oriental Geographer*.

BBS. (2011). *District Survey.* Dhaka: Bangladesh Bureau of Statistics.

BBS. (2011). *District Survey.* Dhaka: Bangladesh Bureau of Statistics.

Field Survey (September 2019).

UP. (2019, September). *UP Digital Center*. Retrieved from http://matarbariup.coxsbazar.gov.bd/

Chapter 7. Annex

KII Checklist

Respondent Name (s) Village Date

Interviewer (s)

1. What are the main changes that have taken place in the locality in the last few years? When did they take place (approximately what year)? What are the causes of these changes? What have been the effects of these changes on the community?

2. Have you noticed changes in (i) flooding, (ii) rainfall, (iii) drought (*monga*), (iv) cyclone, (v) tornado, (vi) storms, (vii) river bank erosion and (viii) salinity intrusion in the last few years?

3. If yes, ask for each of the changes -

   How is it (are they) different from original situation?

   How measured (indicator)?

   When did you first notice the change (year, if possible) and Where?

   What do you think are the main causes or reasons for the change?

   What are the effects of the change that you have seen so far?

   What areas in the union/ aspects of life will be vulnerable to this change?

   What will be the likely effects in the medium to long term? How would you rate the consequence of this change (Not Bad, Bad, Very Bad, Plenty Bad)?

   What do you think is/are the best way(s) to cope with such change?

   What should Government/ UP council do? What should Community groups do (specify)?

   What should family/individuals do? How have people coped with such change(s) in the past?

   Can such traditional coping mechanisms be applied in the present context (Elaborate)?

4. List 5 practices, which contribute to increase the vulnerability of our environment. Detail the effect of each practice. What can be done to increase public awareness of the negative effects of such practices?

5. List 5 practices/ cultural values/institutions, which can contribute to increasing the robustness and resilience of the Union to the impacts of climate and other changes? Detail how each can be harnessed to the Union adaptation efforts

KII List

Sl. No	Name	Designation	Contact No/Location	Date
1	Master Mohammad Ullah	Chairman	01713631377	23-09-2019
2	Azgor Hossain	Local influential person	Rajghat	22-09-2019
3	Md. Yeakub Ali	Local influential person	Matarbari	22-09-2019
4	Mohammad Rashid	CPP Volunteer	Matarbari	23-09-2019
5	Sokun Taj	Member (Reserved)	01858344444	22-09-2019
6	Rafiqul Islam	Local influential person	Matarbari	22-09-2019

FGD Checklist

Livelihood Options, Challenges & opportunities: What are the major occupations in this area? What are the new occupations that have been adopted by the people of this area for their livelihood? What are the occupations gone lost? What are the challenges faced by the existing occupations? Do you predict any future challenges for the existing occupations? If so, do you think there might be new occupations evolved? What might be those new occupations?

Hazard (past, present and future): In the past (Ten / twenty years before from now) what sort of hazards caused disastrous situation in your area? What are the hazards currently causing the same? If the hazards are the same do you notice change of magnitude of causing damages? Or they are the same as before? From your experiences do you predict that the type of hazards might be changed in future (ten to twenty years from now)? If so what might be the new hazards?

Here are some examples of different type of hazards as ready reference: natural (Cyclone, flood, erosion, heat stress, storm surge, storm, strong winds (tornado), earthquake, drought (monga)), human induced (River bank erosion, pollution of water supply), biological (Spread of disease, pests or contaminants among plants, animals or people), and technological (Failure of socio-technical systems related to agriculture, food processing and storage, communications, industrial sites, infrastructure and transportation)

FGD

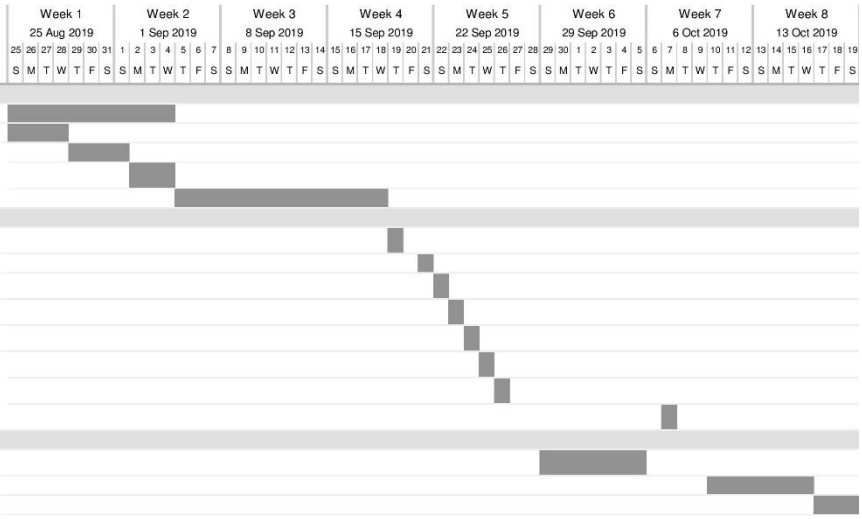
Sl. No	Location	Community	Date
1	Altaf Hossain Market ward no-1	Local Political Leader	22-09-19
2	Balipara Ward no -5	Women	23-09-19
3	Jalia Para Ward no-9	Women	23-09-19
4	Site Para ward no 7	Fishermen	23-09-19
5	Mogdail Bazar Ward no-8	Businessmen	23-09-19
6	Old Bazar Ward no-6	Businessmen	22-09-19
7	Rajghat Ward no-3	Motor driver and Boat owner	22-09-19
8	Santi Bazar Ward no -9	Fishermen and Daylabour	23-09-19
9	Khngso Miyazi para	Women	22-09-19

Schedule of Map and CRA Production

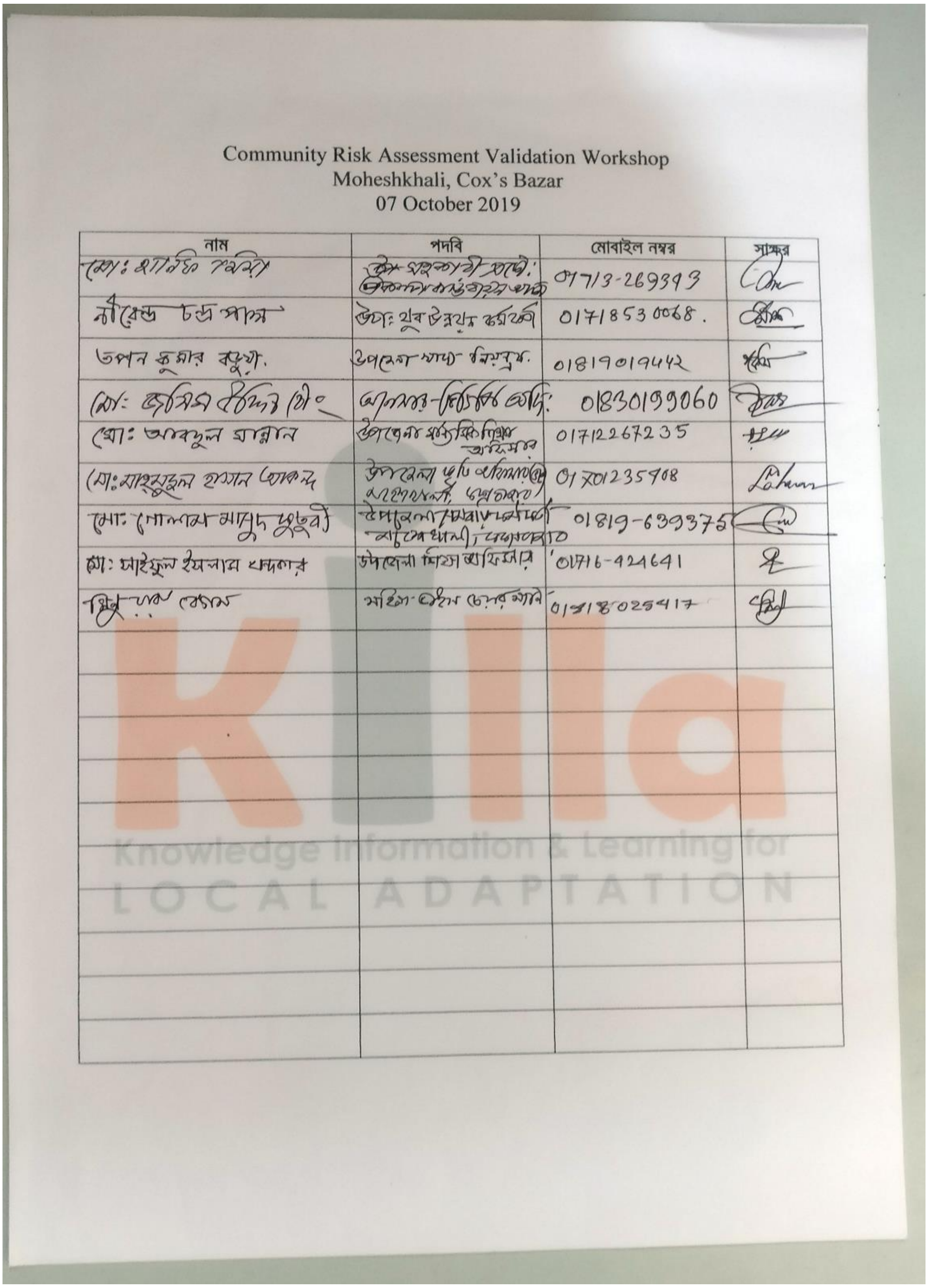
UNDP

Project Start Date 8/25/2019 (Sunday)
Project Manager Cathrine Tranberg Haarsaker

No.	TASK	START	END	DAYS	% DONE	WORK DAYS
1	**Pre-CRA Activities**		-			-
1.1	Mapping	Sun 8/25/19	Wed 9/04/19	11	100%	8
1.1.1	Base Map	Sun 8/25/19	Wed 8/28/19	4	100%	3
1.1.2	Google Map	Thu 8/29/19	Sun 9/01/19	4	100%	2
1.1.3	Landuse Map of 1999, 2009, 2019	Mon 9/02/19	Wed 9/04/19	3	100%	3
1.2	Field Preparation	Thu 9/05/19	Wed 9/18/19	14	100%	10
2	**CRA Field Activities**		-			-
2.1	Travel (Dhaka-Cox's Bazar)	Thu 9/19/19	Thu 9/19/19	1	100%	1
2.2	Village Transect	Sat 9/21/19	Sat 9/21/19	1	100%	0
2.3	FGD (Focus Group Discussion)	Sun 9/22/19	Sun 9/22/19	1	100%	0
2.4	KII (Key Informant Interview)	Mon 9/23/19	Mon 9/23/19	1	100%	1
2.5	LGD (Large Group Discussion)	Tue 9/24/19	Tue 9/24/19	1	100%	1
2.6	Validation Workshop with UDMC	Wed 9/25/19	Wed 9/25/19	1	100%	1
2.7	Travel (Cox's Bazar-Dhaka)	Thu 9/26/19	Thu 9/26/19	1	100%	1
2.8	Validation Workshop with UzDMC	Mon 10/07/19	Mon 10/07/19	1	100%	0
3	**CRA Report Writing**		-			-
3.1	Map Updating & Correction	Sun 9/29/19	Sat 10/05/19	7	100%	5
3.2	Data Analysis	Thu 10/10/19	Wed 10/16/19	7	100%	5
3.3	Report Writing	Thu 10/17/19	Fri 10/25/19	9	100%	7

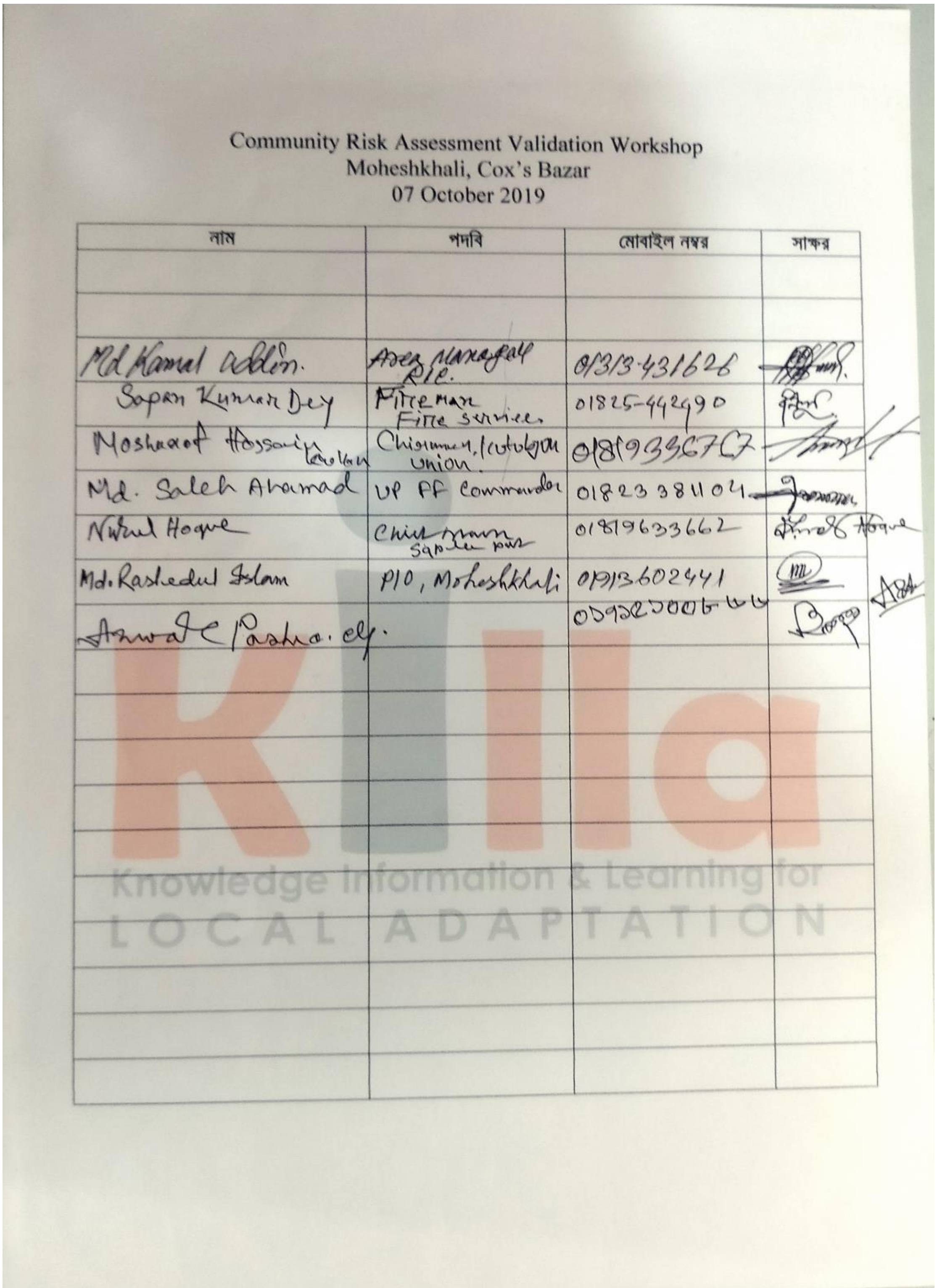


Participants list of Upazila CRA Validation Workshop



Community Risk Assessment Validation Workshop
Moheshkhali, Cox's Bazar
07 October 2019

নাম	পদবি	মোবাইল নম্বর	স্বাক্ষর
মো: [illegible] কবির	[illegible]	01713-269393	
নীরেন্দ্র চন্দ্র পাল	উপ: যুব উন্নয়ন কর্মকর্তা	01718530068.	
তপন কুমার বড়ুয়া.	উপজেলা খাদ্য নিয়ন্ত্রক.	01817019442	
মো: [illegible]	[illegible]	01830199060	
মো: আবদুল মান্নান	উপজেলার মাধ্যমিক শিক্ষা অফিসার	01712267235	
মো: মাহমুদুল হাসান খোন্দকার	উপজেলা কৃষি কর্মকর্তা (অ:) মহেশখালী, কক্সবাজার	01701235408	
মো: গোলাম মাবুদ চৌধুরী	উপজেলা সমবায় কর্মকর্তা মহেশখালী, কক্সবাজার	0181 9-639375	
মো: সাইফুল ইসলাম খন্দকার	উপজেলা শিক্ষা অফিসার	01716-424641	
[illegible]	মহিলা বিষয়ক [illegible]	[illegible]	



Community Risk Assessment Validation Workshop
Moheshkhali, Cox's Bazar
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নাম	পদবি	মোবাইল নম্বর	স্বাক্ষর
Md Kamal uddin.	Area Manager [illegible]	01313-431626	
Sapan Kumar Dey	Fireman Fire service	01825-442990	
Mosharof Hossain [illegible]	Chairman, Kutubjom union	01819336707	
Md. Saleh Ahamad	UP FF Commander	01823381104	
Nurul Hoque	Chairman Saplapur	01819633662	
Md. Rashedul Islam	PIO, Moheshkhali	01913602441	
[illegible] Pasha. [illegible]		০১৯৯২৫০০৮৬৬	

Focused group discussion ward no 3

Focused group discussion ward no 9

Settlements of Sairardail slop of the embankments

Embankment of ward no 5


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