Community Risk Assessment

Baraghope Union, Kutubdia, Cox's Bazar

November 2019

Empowered lives.
Resilient nations.

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Chapter 1: Introduction

Community Risk Assessment (CRA) is the participatory process for assessing hazards, vulnerabilities, risks, ability to cope, preparing coping strategies and finally preparing a risk reduction options implementation plan for a local community. Scientific information, predictions, and participatory discourses are used in CRA to identify, analyze, and evaluate risk environment of a particular community, reach consensus amongst the community on actions needed to manage the risk environment. When a community is vulnerable to disasters that cause a great deal of damage to the livelihood and property, CRA identifies the most vulnerable areas and communities and evaluates the risks to identify risk reduction options. The method recognizes that vulnerability, loss, reduction or mitigation strategy and coping mechanism vary from one community to another, and also between different groups (e.g. women, person with disability, landless, farmers-fisher folks) within the same community. It ensures representation of professional, community and other groups, and that their points of views are reflected.

1.1. A Short History of the Union

Kutubdia Upazila is one of the most isolated islands of Cox's Bazar District in the Division of Chattogram bounded by the Bay of Bengal on the north, south and west, Kutubdia channel, Banshkhali, Chakaria and Moheshkhali on the east. Kutubdia Upazila is located at 21.8167° north and 91.8583° east. Kutubdia Thana was established in 1917 and was promoted to Upazila in 1983. The only town of the island is Baraghope, with an area of 5.73 km^2. Kutubdia Upazila is inhabited by an approximate 125,279 persons from 55 villages under 6 Unions of Baraghope, Ali Akbar Dail, North Dhurung, South Dhurung, Lemshikhali, Kaiyarbil and 9 Mauzas/Mahallas (BANGLADESH BUREAU OF STATISTICS, 2011). The island is famous for the only lighthouse in Bangladesh, which was built by the British during the British rule. Kutubdia thrives in salt and dried fish production - locally known as 'Shutki'. Hence, the main occupations of the population are fisheries and salt cultivation.

Baraghope Union is located in the middle of Kutubdia Upazila. Kutubdia Upazila Sadar is located in this union. To its north are the Kairibal Union and Lemshikhali Union; the Kutubdia Channel and Magnama Union of the Pekua Upazilas on the east; Ali Akbar Dail Union on the south; and the Bay of Bengal on the west. The total area of this union is 5.73 km^2

(1415 acres) (BANGLADESH BUREAU OF STATISTICS, 2011). In this union there are 1 mouza and total 9 villages. The main Occupation of people are farming and fishing. This union is surrounded by the Bay of Bengal from west side and has a sandy beach like Cox's Bazar. The landscape beside the beach has lots of variation in Kutubdia as, it contains Jhau tree, some contains villages, some contains salt farm. The residents of this union speak among themselves using the Chattogram regional language. Being in the center of Kutubdia, this union offers different kind of facilities than other unions of Kutubdia Upazila (i.e. Police Station, Fire Service and Civil Defence, Bank, Upazila Offices, Upazila Quarter, hotel, restaurants, markets).

1.2. Demographic Information

Baraghope Union is the 5th union council under Kutubdia Upazila. The administrative activities of the union are under the Kutubdia police station. It is part of the constituency Cox's Bazar-2, 295th seat of the National Parliament. The following table shows the village wise population distribution in Baraghope Union (Bangladesh National Portal, 2017).

Table 1: Village wise Population Distribution (Source: Bangladesh National Portal, 2017)

Ward No	Village Name	Population
1 no ward	North Baraghope	2,920
2 no ward	Matabborpara	2,808
3 no ward	Romaipara, Ghonarmor	2,470
4 no ward	Omjakhali	2,350
5 no ward	Mogdale	3,600
6 no ward	Muralia	3,300
7 no ward	Ajom colony	2,850
8 no ward	Monohorkhali	2,600
9 no ward	Arab Shikderpara, Syed para	2,980

Community Risk Assessment Report

Base Map: Baraghope Union, Kutubdia Upazila, Cox's Bazar

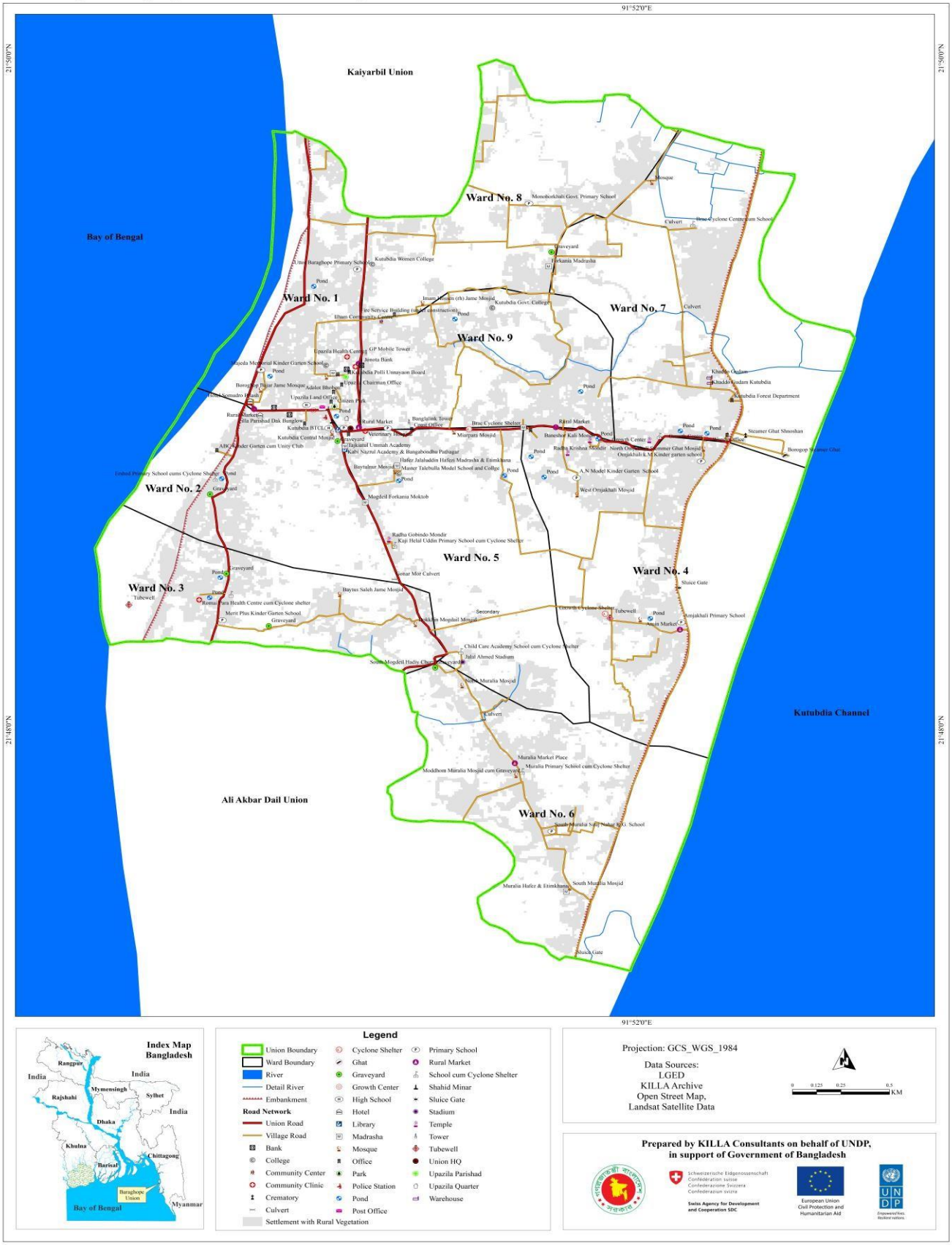

Figure 1: Base Map of Baraghope Union

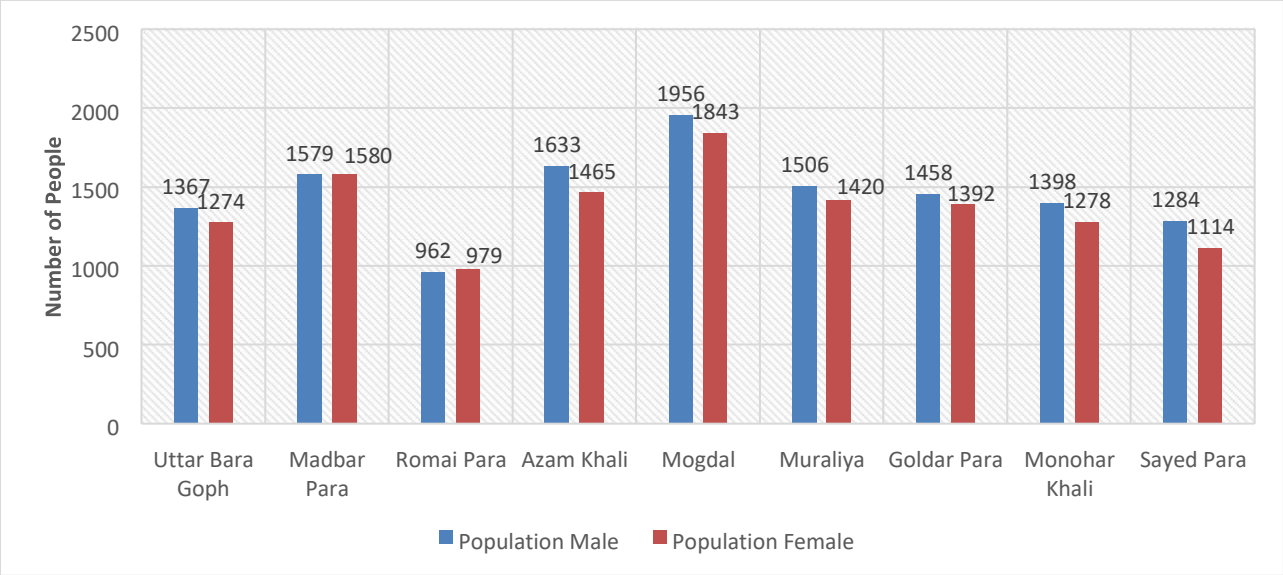

Figure 2: Administrative Unit wise Male-Female Population (BANGLADESH BUREAU OF STATISTICS, 2011)

This union has a total of 9 wards. According to Population and Housing Census 2011, the total population of the union is 25,488 in 4,688 households of which 13,143 are males and 12,345 are females. The sex ratio of the union is 106 in 2011 as compared to 108 in 2001. The decadal population growth rate for the union is 18.30% and the annual compound growth rate is 1.6%. The growth rate has been fluctuating over the decades 1951-2011 (BANGLADESH BUREAU OF STATISTICS, 2011).

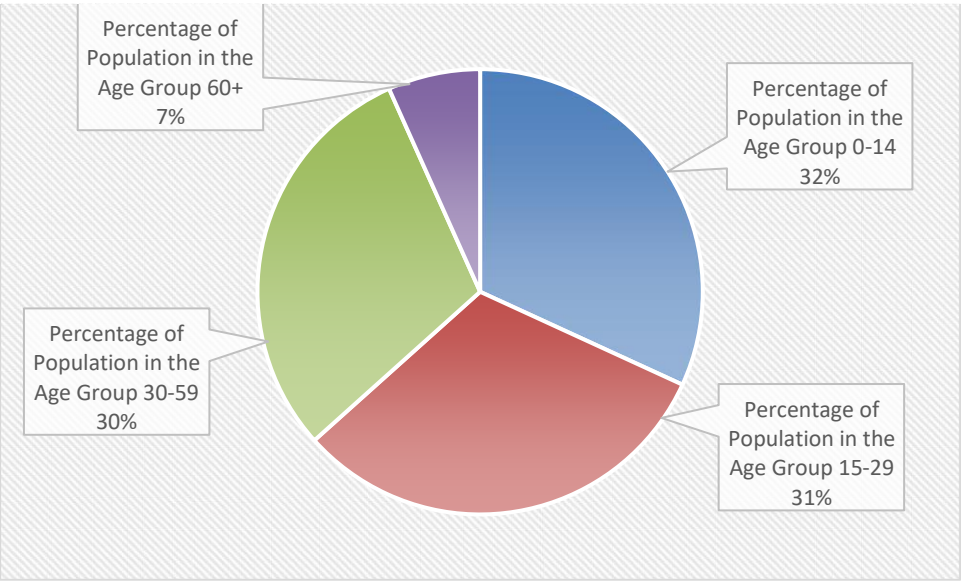

Figure 3: Percentage of Population in the Age Group (BANGLADESH BUREAU OF STATISTICS, 2011)

This figure shows the distribution of the population according to age. Information, identified by sex and age group, is distributed as follows: 0-14 years (children), 15-29 years (early working age), 30-59 years

(prime working age), 60 years and over (elderly). According to Population and Housing Census 2011, 32% of total population belong to the children group, 31% belong to the early working age group, 30% belong to the prime working age group and 7% are in the elderly group. In Baraghope, Muslims have the greatest majority of 87% and the rest are comprised of Hindus (12%) and Christians (1%). There are no ethnic minorities in this union. The total number of people with disability is 535 people (BANGLADESH BUREAU OF STATISTICS, 2011).

1.3. Socio-Economic Condition of the Union

As per UNDRR (2019), "research suggests that disasters cause impoverishment, which can lead to a cycle of losses, poverty traps and a slowing of efforts to reduce poverty." Utilizing information collected from secondary data (BBS, November 2011) and the CRA field survey, the below section analyses the indicators of local socioeconomic conditions of Baraghope union, including infrastructure, housing stock, livelihoods, literacy and electrification.

a. Literacy rate: Literacy rate in Baraghope union is 37.9%. Literacy rate is 39.1% for male and 36.6% for female, which shows the tendency that it is slightly lower for female (BANGLADESH BUREAU OF STATISTICS, 2011).

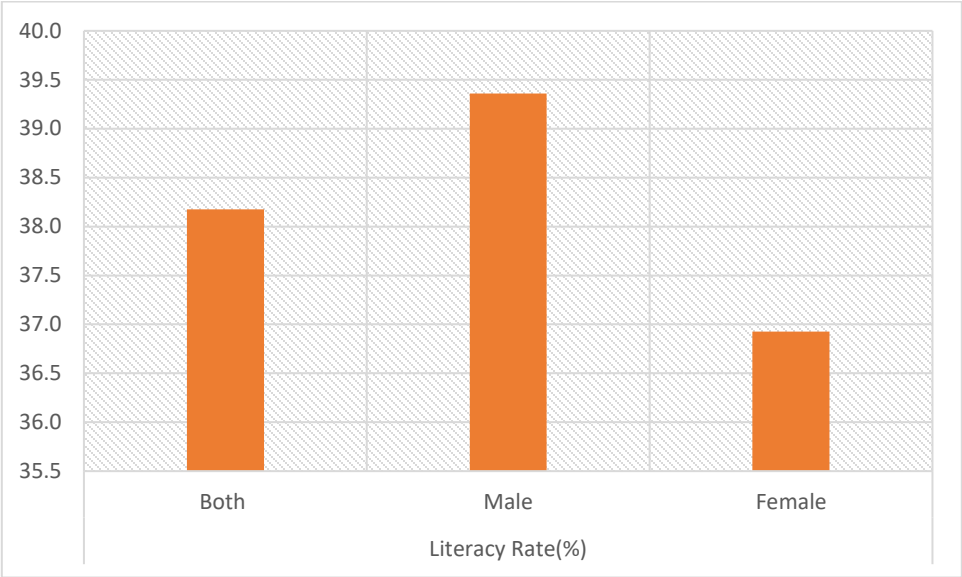

Figure 4: Distribution of Population aged 7 years and above by Literacy (BANGLADESH BUREAU OF STATISTICS, 2011)

b. Types of Structure: In Baraghope union, 18% of general households lives in pucka and/or semi-pucka houses made of solid and permanent materials, 82% in kutcha houses made of natural material and/or jhupri, made of temporary materials (BANGLADESH BUREAU OF STATISTICS, 2011).

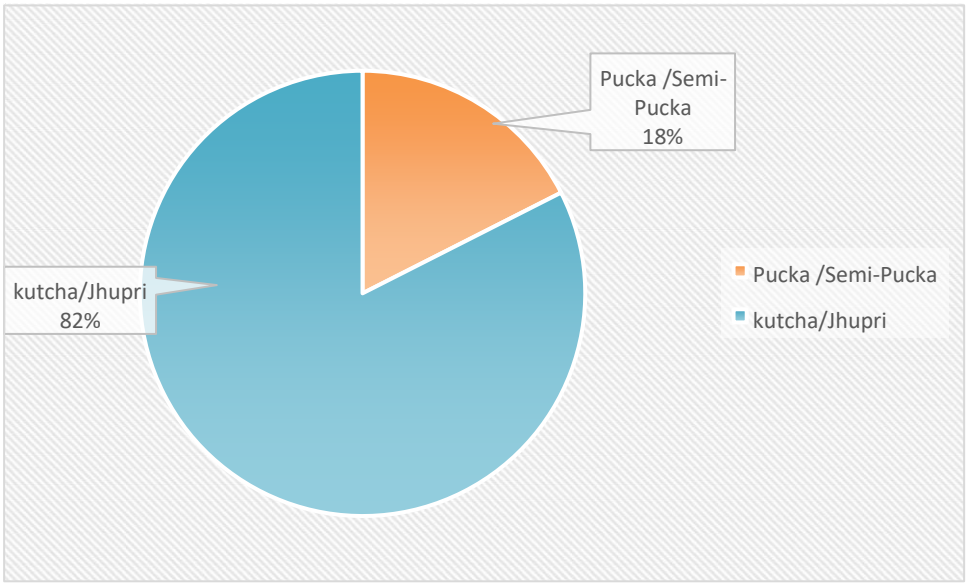

Figure 5: Percentage Distribution of Households by Types of Structure and Housing Tenancy Status (BANGLADESH BUREAU OF STATISTICS, 2011)

c. Toilet Facility: In Baraghope union, 84% of general households uses sanitary latrine and the remaining 16% household uses non-sanitary latrine. The number of households with non-sanitary latrine is lower than households with sanitary latrine (BANGLADESH BUREAU OF STATISTICS, 2011).

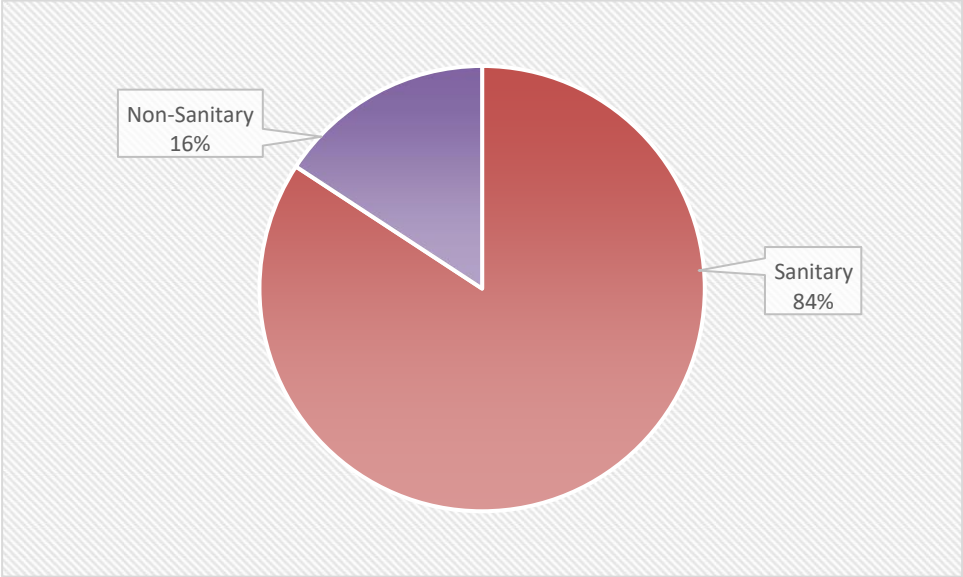

Figure 6: Percentage Distribution of Households by Toilet Facility (BANGLADESH BUREAU OF STATISTICS, 2011)

d. Source of Drinking Water: 93.9% of general households gets drinking water from tube-well, 0.3% from tap and the remaining 5.8% of the households gets water from other sources (i.e. pond, well, rainwater harvesting, Pond Sand Filter) (BANGLADESH BUREAU OF STATISTICS, 2011).

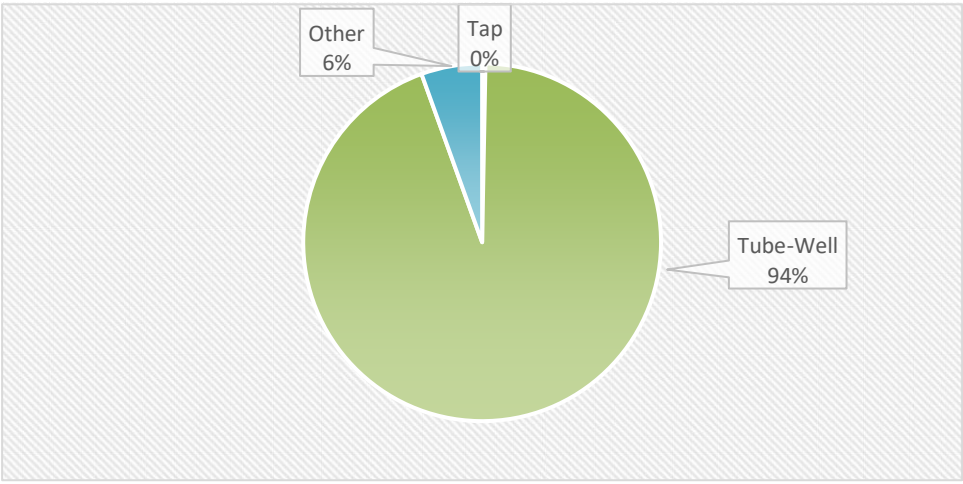

Figure 7: Percentage Distribution of Households by Source of Drinking Water (BANGLADESH BUREAU OF STATISTICS, 2011)

e. Electricity Connection: The Area has been brought under coverage from the Rural Electrification Program. However, a total of only 5.1% of general households was reported to have electricity connection in the entire Upazila in 2011 as compared to 2.2% in 2001. It should be noted that by having the wind power station, the people of whole Kutubdia Upazila gets electricity for three days in a month. Though some villages shows a higher level of electrification i.e. 13.9% in Uttar Baraghope, 7.9% in Madbar Para, 8.9% Sayed Para, it is worth noting that the percentage other hosuseholds in other villages having electricity connection is much lower in whole union (BANGLADESH BUREAU OF STATISTICS, 2011).

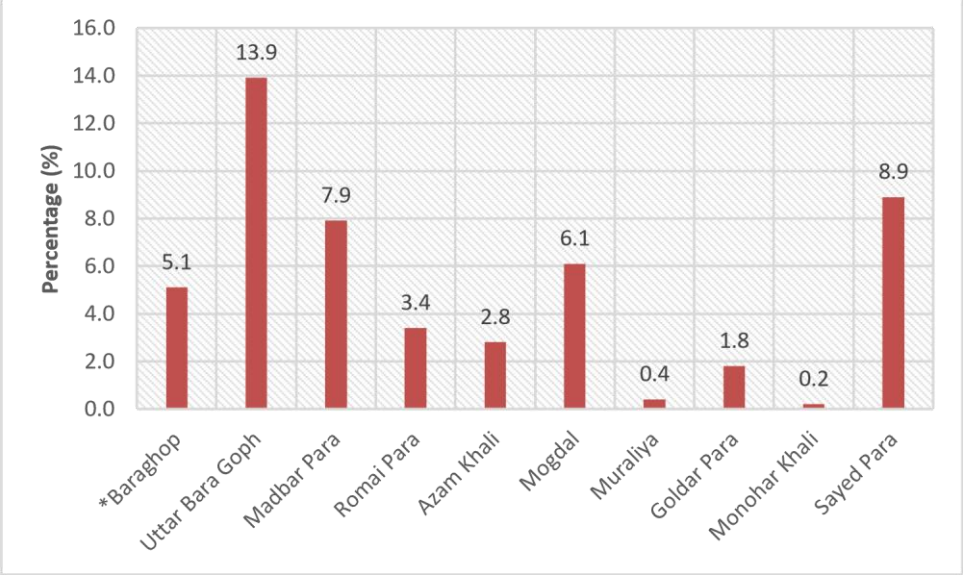

Figure 8: Percentage Distribution of Electricity Connection (BANGLADESH BUREAU OF STATISTICS, 2011)

f. Poverty: According to the collected data during CRA field work, about 20% of the population is extremely poor, an estimated 40% is poor, 10% is marginal poor, and about 30% of the regional population lives above the poverty level. Any kind of natural or manmade disaster makes this aspect worse than previously indicated.

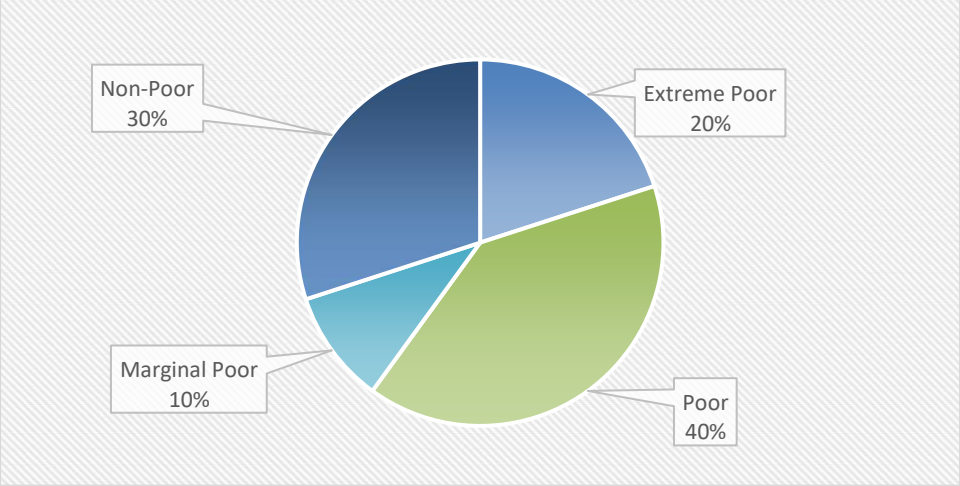

Figure 9: Economic Status of People (Percentage) (Source: CRA field data)

The Socio-economic condition of Baraghope union is comparatively better than that of Kutubdia. The rate of educated people of Baraghope is almost 60% (according to the local community representatives consulted in the course of the CRA). Communication and health facilities are relatively good in Baraghope as there is a government hospital and a 13 km pucka road. The main natural resources of this union are fish and salt.

Though urbanization is around 40% (CRA field data), there is little difference between urban and rural areas. About 40% of the population of this union are engaged mostly in agriculture. Most of them work in salt production. The said profession dominates the economy of Kutubdia. Some people are engaged in salt cultivation during the day and perform night guard duty in the evening. They are also engaged in fishing and 60% of the total population is either directly or indirectly dependent on the fishing industry. Katubdia is an island that is also an important exporter of salt and fish to other Upazilas. An interesting point is that their occupation changes with the course of nature. When they face problems or seasonal variations, they switch to another work. Some members of the population are engaged in teaching. In addition, they cultivate their fallow land and produce vegetables. Those who have no lands to cultivate nor other professional activities, are engaged as day laborers. The women of Baraghope union are not engaged in any type of economic activity or job other than doing household chores, vegetable cultivation, as well as cattle and poultry rearing.

Table 2: Demographic and Socio-Economic Condition of Baraghope Union

Administrative Unit Residence Community	Area in Acres	Total Household	Population		Sex Ratio	Percentage of Population in the Age Group				Literacy Rate(%)			Number of People With Disability	Total Household (Ethnic Population)	Type of structure(%)		Toilet Facility(%)		Source of Drinking Water (%)			Electricity Connection (%)
			Male	Female		0-14	15-29	30-59	60+	Both	Male	Female			Pucka/ SemiPucka	Kutcha / Jhupri	Sanitary	Non-Sanitary	Tap	Tube-Well	Other	
Baraghope Union Total	1415	4688	13143	12345	106	27.4	27.2	25.9	5.8	37.9	39.1	36.6	535	3.0	17.4	82.6	82.0	15.1	0.3	93.9	5.8	5.1
Baraghope Union		4688	13143	12345	106	27.4	27.2	25.9	5.8	37.9	39.1	36.6			17.4	82.6	82.0	15.1	0.3	93.9	5.8	5.1
*Baraghope		4688	13143	12345	106	27.4	27.2	25.9	5.8	37.9	39.1	36.6			17.4	82.6	82.0	15.1	0.3	93.9	5.8	5.1
Uttar Bara Goph		452	1367	1274	107	24.6	27	27.3	5.7	44.2	45.0	43.4			29.4	70.6	71.9	26.1	0.7	85.0	14.4	13.9
Madbar Para		596	1579	1580	100	28.4	26.5	25.3	6.3	35.2	36.4	34.0			14.0	86.1	73.9	23.5	0.0	99.7	0.3	7.9
Romai Para		323	962	979	98	29.9	26.6	24.5	5.2	45.3	45.8	44.8			11.1	88.8	85.4	8.7	0.0	96.9	3.1	3.4
Azam Khali		580	1633	1465	111	28.6	27.6	25.4	4.8	23.8	25.2	22.3			4.5	95.5	74.7	25.2	0.0	100.0	0.0	2.8
Mogdal		707	1956	1843	106	25.6	27.8	26.4	6.8	45.9	48.2	43.5			17.8	82.2	98.9	0.0	0.0	81.5	18.5	6.1
Muraliya		514	1506	1420	106	28.3	27.4	25.7	4.7	43.2	44.2	42.2			7.6	92.4	53.3	31.0	1.4	86.9	11.7	0.4
Goldar Para		500	1458	1392	105	27.2	27.5	25.8	6.2	18.8	20.4	17.1			5.8	94.2	77.0	22.6	0.0	99.0	1.0	1.8
Monohar Khali		509	1398	1278	109	27.9	27	25.3	5.9	36.3	37.4	35.0			29.1	70.9	99.0	1.0	0.0	100.0	0.0	0.2
Sayed Para		507	1284	1114	115	27.2	27.4	26.5	6.5	51.7	52.4	51.0			38.8	61.1	99.8	0.0	0.4	99.6	0.0	8.9

*Mouza Source: BANGLADESH BUREAU OF STATISTICS "Population and Housing Census -2011 Community Report: Cox's Bazar (BANGLADESH BUREAU OF STATISTICS, 2011)

1.4. Local Resources

Baraghope union has a lot of 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. Physical elements include primary schools, health centers, mosques, cemetery, community clinics, banks, organizations, offices, an orphanage, jetty ghat, madrassas, and cyclone shelters. Transport sectors include roads (paved and unpaved roads). These elements are highly exposed to cyclones, storm surges, tidal floods, and coastal erosions as well as water logging.

According to the locals, Baraghope Union is considered as the capital of the Kutubdia Upazila. High salinity intrusion and coastal-dominated livelihoods make the people and resources vulnerable. Among the physical elements, the school, madrasah, cyclone shelters are highly exposed to sea and cyclone that cause tidal surges. Most of the houses are jhupri, built alongside the embankment in clusters and these houses do not have the capacity to face strong ocean currents and surges. Therefore, these houses are fully exposed and are first to get hit by the hazard impacts. The roads are exposed to water logging, storm surge and tidal flood. The soil quality is substandard in such manner that for slop protection of the roads, guide wall is necessary. Due to the high salinity concentration, the buildings' construction materials are easily damaged.

Table 3: Number of Educational Institutes

Educational Institution	Number
Government Primary Schools	5
Private Primary Schools	5
High Schools	2
Government College	1
Fazil Madrasha	1
Dakhil/Forkania Madrasha	4

**Source: CRA field data*

Chapter 2: Local Hazards and Vulnerabilities

In this segment, local hazards that are recurrent in the community and the characteristics determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards will be identified.

2.1. Historical Analysis of Hazards

Kutubdia is extremely prone to natural disasters, mostly cyclones. In 1991, a cyclone killed at least 138,000 people, and caused around 22,000 deaths in Kutubdia. Most of the families of Kutubdia lost their loved ones during this catastrophe. Because of other severe cyclones, people of this area lost their properties. The population had terrible experiences of Roanu in 2016 because of saline water intrusion, high wind speed and water logging problems. A storm surge up to 7 feet above the astronomical tide hit the island. In the case of 3- to 4-meter inundation, almost all the kutcha roads and all the bazaars of Baraghope union will be inundated (Ahmed & Anwar, 2012). Large amounts of vulnerable features (physical infrastructures, agricultural fields, salt fields, settlements, sources of drinking water) and inadequate number of shelters make the area riskier. Another main problem of Baraghope is the continuous erosion of land. The land of this union erodes in an enormous rate. The Coast Trust estimates that if the erosion continues at the same rate, Kutubdia Upazila will completely vanish from the map in 70 years. However, erosion mainly occurs every year during the high monsoon tides. A government-built embankment has changed the rate of erosion in recent years. But where the embankment does not exist or is broken, the sea continues to swallow land. There is evidence that the rate of erosion has increased in Baraghope in the past few years (Tanim & Roy, 2013). This continuous erosion makes the union more vulnerable and more prone to hazards as the embankment is eroding every year due to lack of proper protective measures. Locals state that from 2006 to 2013, there is an excessive erosion of land.

With the ongoing erosion due to the stronger and bigger waves, the union continues to be inundated. Fishermen and salt workers have been swamped by huge waves, and about 3,000 people have migrated from many villages since 1991 (Tanim & Roy, 2013). Some marginal level of

mangrove plantation has been so far done out of government initiatives. Mangroves are being destroyed gradually by the shrimp culture and salt fields. On the other hand, the Water Development

Board built 40 kilometers of embankment to protect Kutubdia from erosion, 24 kilometers of which have been damaged in the cyclone of 1991, further damaged in cyclone Roanu of 2006 and flood in July 2019. Embankment of the east side was totally damaged. Agricultural land and households were affected by the event. All the agricultural crops were damaged due to saline water intrusion after the flood.

No scientific monitoring of sea-level rise has been done on Kutubdia, but nearly 8 mm a year of increase has been recorded over 30 years at Cox's Bazar (Tanim & Roy, 2013). This is nearly three times the average for Bangladesh and up to five times of the world average sea-level rise (Ahmed & Anwar, 2012; Tanim & Roy, 2013). Besides the continuous erosion, this sea level rise also increases the vulnerability of the union. It was previously said that Kutubdia is full of economic activity. Most of these activities are related to fishing and salt farming.

Farming, one of the two main livelihoods on the island, is gradually being abandoned due to the shrinkage of arable land. Despite having a large amount of resources, people of this area cannot utilize its resources properly. BRAC, Gana Swasthya Kendra, Prism Bangladesh, IFAD Unnayan Sahajogi Team, Grameen Bank, Coast, PKSF are working here. They are trying to improve the livelihoods and standards of living of local people. However, people are becoming indebted to microcredit schemes to pay off previous debts. This signifies a vicious cycle. Sometime their income is less than the expenditure. This situation is making them economically vulnerable. People of this area are detached from mainland Bangladesh. They have to cross the Kutubdia channel to do any kind of business or job in the main land. It takes around 40tk per person to cross the channel. Hence, even if they can find an opportunity in the main land, they do not find it feasible to cross the channel twice daily to do the job. They have to migrate there.

Due to these vulnerabilities, people of this area are interested to migrate to other Upazilas. There are different kinds of migration, which are common here. Among them is step migration (migration as occurring stage by stage as rural inhabitants move closer to urban areas of growth), chain

migration (migrants from a particular area follow others from that area to a particular destination), and seasonal migration (driven by seasonal peaks in labor demand, mostly in agriculture, but some people change their location because of climate) are very common. Though they are involved in different types of economic activities, they have to abandon these activities for the sake of migration.

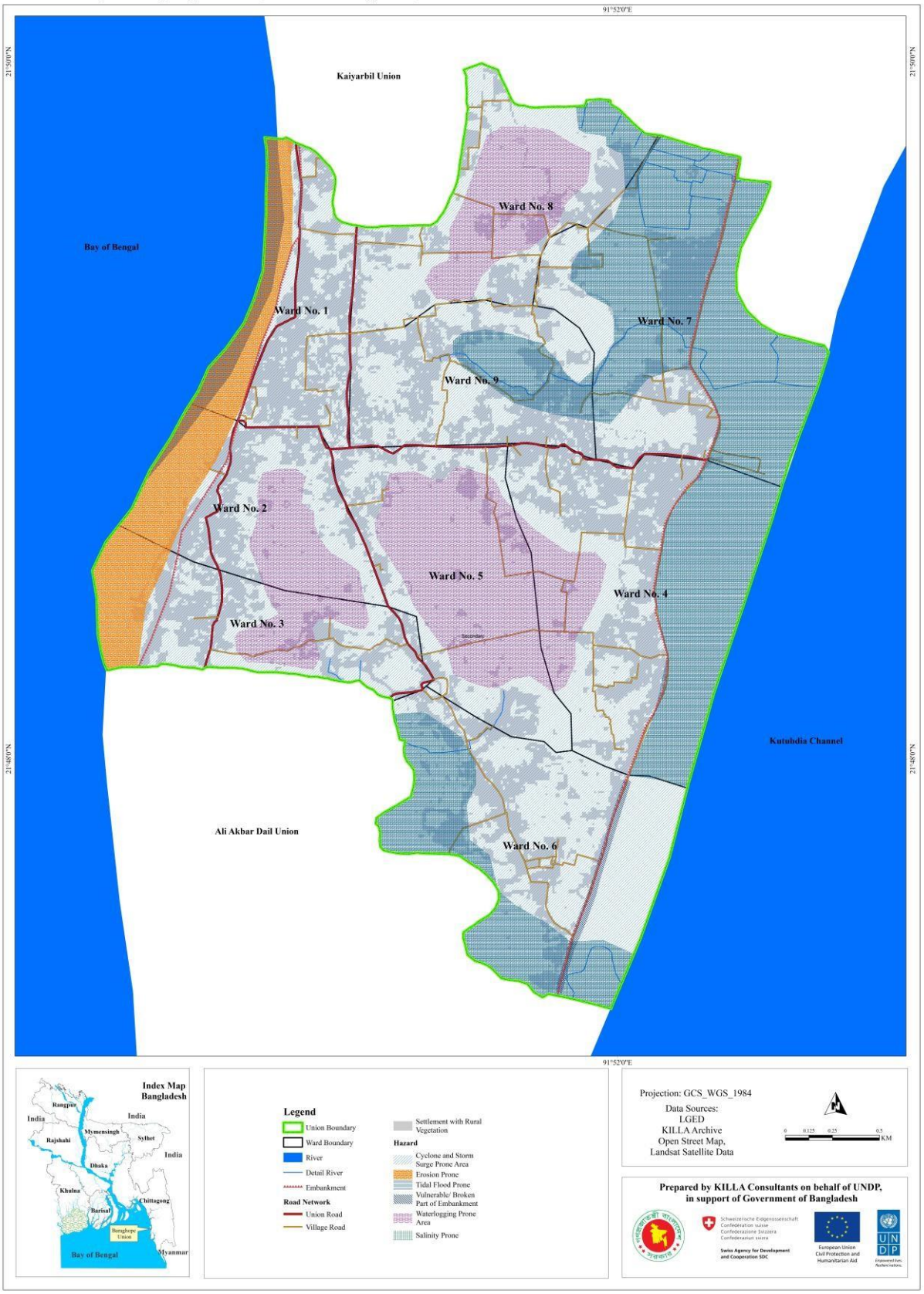

Figure 10: Hazard Map of Baraghope Union (Source: Satellite data, open street map, community participation and field survey, 2019)

2.2. Hazard Venn and Calendar/ Seasonality

The Hazard Venn is very effective to show the intensity and frequency of the hazards in a region. Baraghope Union is affected by different kinds of hazards, and among them cyclones and storm surges, tidal floods, embankment erosions, as well as saline water intrusions are significant. The hazard Venn size of the diagram will represent the intensity of the hazard, and the distance from the union will represent the frequency of the hazard in that region. Baraghope Union is exposed to the ocean through the partially-damaged embankment. Every month, there are two big high tides and, in such periods, saline water intrusion becomes the most crucial problem for the farmers. Cyclones and storm surges occur with an interval of several years but impact of cyclone is very high. Embankment erosion occurs all the time of the year because the concrete element of the embankment comes in the contact with the saline water and loses its potential.

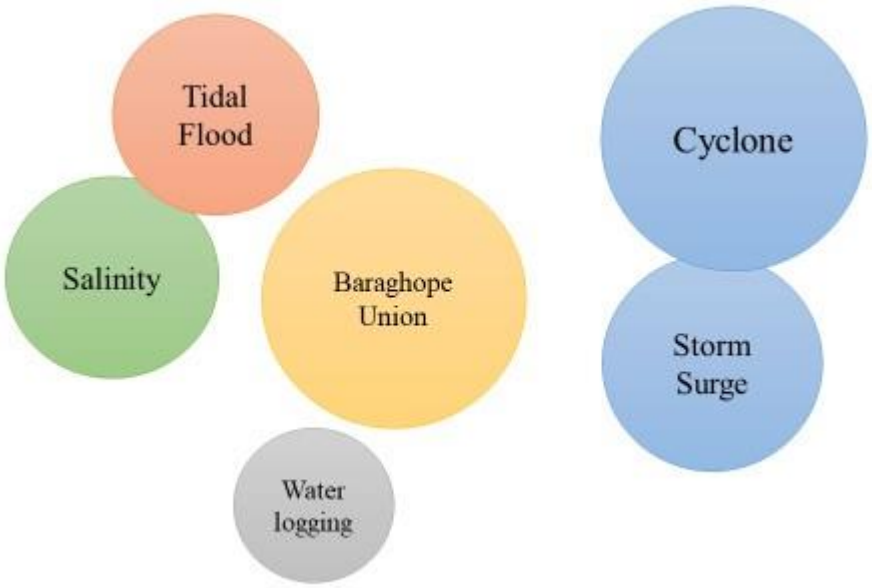

Figure 11: Hazard Venn of Baraghope Union (Source: CRA field data)

This Venn diagram indicates that cyclones occur every 4 to 5 years but its effects are usually extremely devastating. On the other hand, salinity, tidal effect, heavy rainfall are evident effects that come about almost every year. The effects of these hazards are also harmful to people but not as destructive as cyclones. These hazards are part of their life.

Hazard calendar is a list of all the significant hazards of a region with an indication of possible timeline and likelihood of occurrences throughout a year. In Baraghope Union, cyclones occur more between April to August (Bengali Baishak to Vadra months). During this period,

storm surges also happen the most. A storm surge occurs after a severe cyclone when the bulk amount of water comes from the ocean with the wind towards the mainland and washes everything in the path. Hail storm occurs mostly during Baishak – Jaistha (mid-April to mid-June) months. Saline water intrusion is another severe hazard in Baraghope Union, and it occurs frequently over the year. During the Baishak – Vadra months (mid-April to mid-August), it occurs mostly because of the severe high tide. Beach erosion continues throughout the year but mostly occurs in Ashar – Vadra (mid-June to mid-August) months.

Table 4: Hazard Calendar/ Seasonality of Baraghope Union (Source: CRA field data)

Hazard	Baishak (Mid-April)	Jaishtha (Mid-May)	Ashar (Mid-June)	Srabon (Mid-July)	Vadra (Mid-August)	Ashin (Mid-September)	Kartrik (Mid-October)	Agrahayon (Mid-November)	Poush (Mid-December)	Magh (Mid-January)	Falgun (Mid-February)	Chaitra (Mid-March)
Cyclone												
Storm Surge												
Nor'westers												
Waterlogging												
Tidal Flood												
Saline water intrusion												
Erosion												

2.3. Crop Seasonality and Exposure to Hazards

The Crop Calendar is a tool that provides timely information about seeds to promote local crop production. It contains information on planting, sowing and harvesting periods of locally adapted crops in specific agro-ecological zones. Crop seasonality is broadly classified in three classes depending on the cropping patterns, i.e. Rabi Crop (Kartrik–Chaitra or mid-October to mid-March), Kharip-1 (Chaitra – Srabon or mid-March to mid-July), Kharip -2 (Srabon – Kartrik or mid-July to mid-October). Rabi crops consist of cucumber, brinjal, and salt farming. Kharip -1 crops consist of rice (BRRI 28, BRRI 48, BRRI 58), chili. Kharip-2 crops include tomatoes and different vegetables.

Table 5: Crop Seasonality of Baraghope Union (Source: CRA field data)

Crop Season	Crop Name	Baishak (Mid-April)	Jaishtha (Mid-May)	Ashar (Mid-June)	Srabon (Mid-July)	Vadra (Mid-August)	Ashin (Mid-September)	Kartrik (Mid-October)	Agrahayon (Mid-November)	Poush (Mid-December)	Magh (Mid-January)	Falgun (Mid-February)	Chaitra (Mid-March)
Kharip -1	BRRI-28	→		←	—	—	→				←	—	—
	BRRI-48		←	—	—	—	→		→				
	BRRI-49, TIA									←	—	—	→
	Chili	→										←	—
Kharip -2	Tomato								←	—	—	—	→
Rabi	Cucumber						←	—	—	→			
	Brinjal						←	—	—	→			

	Salt Farming	→						←					

From the above-described crops, some are more exposed to hazards because of the cropping season. Kharip-1 includes BRRI-28,48 and 58, which have the same seasonality with the high tide. In those months, the sea becomes rough and high tides often overflow the embankment. As a result, saline water intrusion occurs in the agricultural land. Without proper and secured embankment, these crops will not be well protected from the hazards. Salt farming is one of the main occupations in the Baraghope Union. For salt farming, the most alarming hazards are rainfall and saline water intrusion into the field. This extra water slows down the salt farming process.

2.4. Land Use/ Land Cover Pattern

In the Baraghope Union, about 70% land can be cultivated. This cultivable land includes tri-cropping, bi-cropping and single cropping agricultural fields. In the agricultural sector, there are so many vulnerabilities. The most significant hazard is saline water intrusion in the mainland. Saline water is also the main problem for the agricultural land. The faulty embankment is responsible for this. This saline water intrusion mainly occurs during the monthly two-time high tide. Locally, they call it "Joo". Other vulnerabilities in the agricultural sector include lack of proper cultivation knowledge of the cropping. The total agricultural land is reduced day by day because of saline waterlogging. It is to be noted that salt farming is also included in the agricultural sector. In this sector, rainfall is the main problem and counts as most significant vulnerability as rainfall in the salt farm delays the process of salt cultivation.

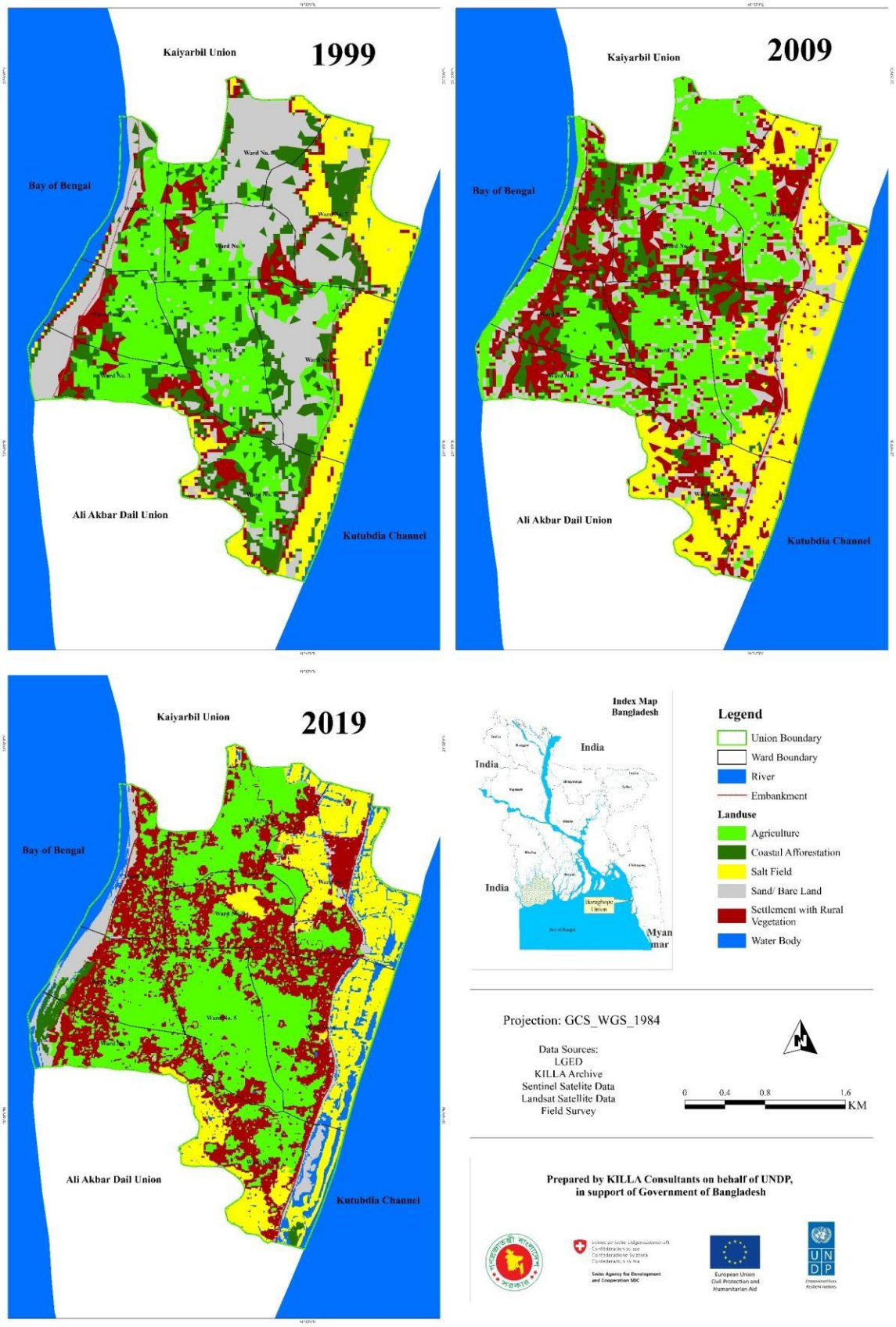
Kaiyarbil Union
1999
Bay of Bengal
Ali Akbar Dail Union
Kutubdia Channel
Kaiyarbil Union
2009
Bay of Bengal
Ali Akbar Dail Union
Kutubdia Channel
Kaiyarbil Union
2019
Bay of Bengal
Ali Akbar Dail Union
Kutubdia Channel
Index Map
Bangladesh
India
India
India
Myan
mar
Legend
Union Boundary
Ward Boundary
River
Embankment
Landuse
Agriculture
Coastal Afforestation
Salt Field
Sand/ Bare Land
Settlement with Rural Vegetation
Water Body
Projection: GCS_WGS_1984
Data Sources:
LGED
KILLA Archive
Sentinel Satelite Data
Landsat Satellite Data
Field Survey
0 0.4 0.8 1.6
KM
Prepared by KILLA Consultants on behalf of UNDP,
in support of Government of Bangladesh
Swiss Agency for Development and Cooperation SDC
European Union Civil Protection and Humanitarian Aid

Figure 12: Landuse Map of Baraghope Union

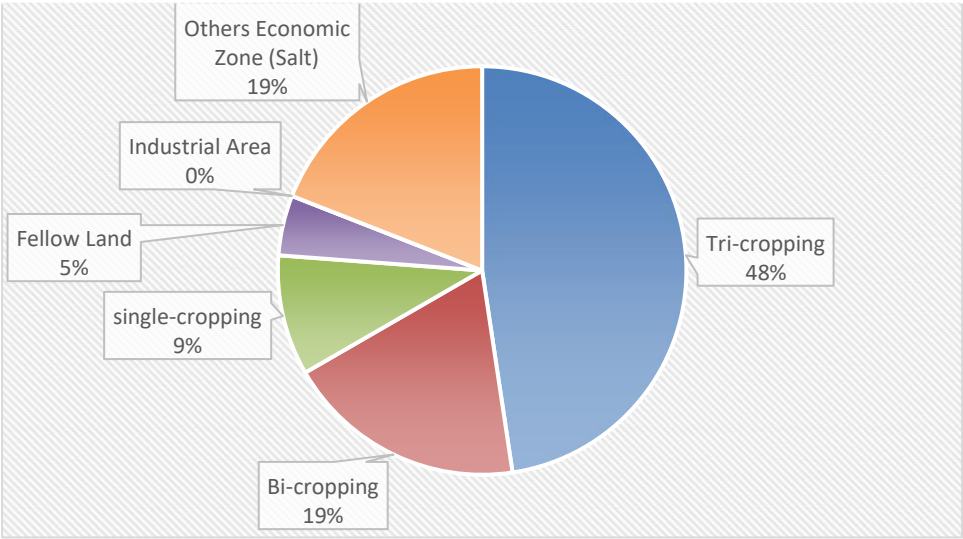

Figure 13: Percentage of Area in Different Land Uses (Source: CRA field data)

2.5. Livelihood Options and Vulnerability

The livelihoods of the population of Baraghope Union are mostly related to agriculture and fishing. In the agriculture sector, cropping and salt farming are significant. Fishing is the main livelihood option for the population of the Baraghope Union. However, there are some problems relevant to the fishing sector as fishing in the deep sea requires a lot of equipment with a well-structured boat and these may get damaged due to a cyclone. Regardless of their occupation, people in Baraghope carry on with their occupations and survive hazard season. Because of this, they face various kinds of vulnerabilities due to disasters, climate change and extreme weather. These include:

- Farmers: Have to face long term loss of crop and land;
- Agriculture Labor: Work is not available in agricultural field during and after hazard. It becomes very difficult for farmers to secure a job for livelihood;
- Fishermen: They cannot go to the sea to catch fish. Hence, the fishing business falls apart. In addition, they have to face the loss of their boats;
- Salt farmers: Salt washes away the salt during cyclone with tidal surge.
- Day Labor: There is no work during disasters.
- Businessmen: They face a lot of losses. Those who are involved in the fishing business suffer as their potential catch disappears and the boats are broken due to heavy winds.

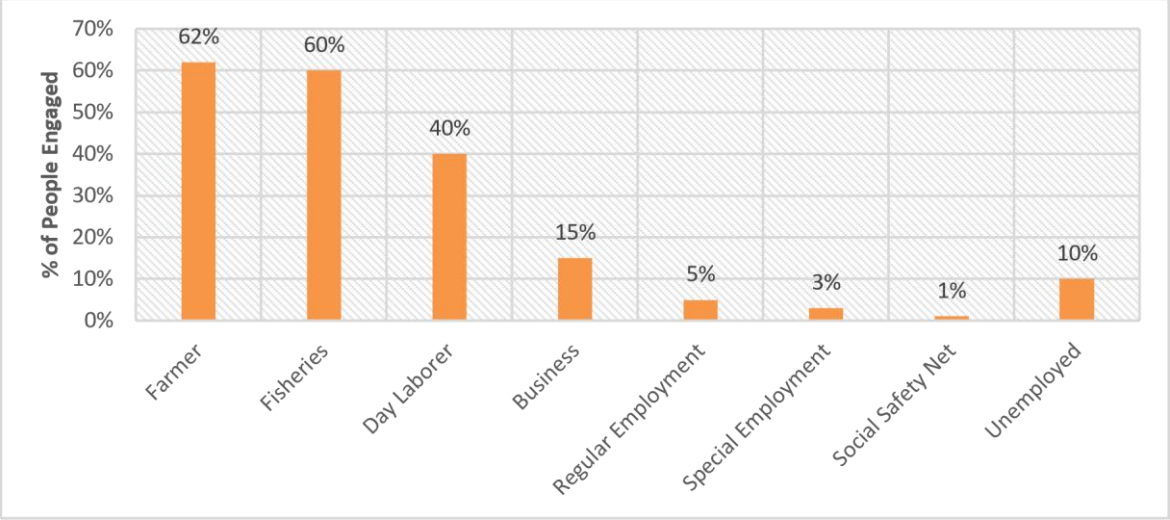

Figure 14: Percentage of people engaged in different Employment (Source: CRA field data)

According to the CRA field data of the Baraghope Union, there are about 62% people who work in the agricultural sector. The agricultural sector is broad as it includes rice, vegetables, fruits. In the fishing sector, most of the fishermen work for investors. More than half (60%) of the population is involved in fishing. lack of proper equipment is the main vulnerability of this sector. Every year, a significant number of fishermen lose their lives by going to the sea to fish. This is due to the poor communication system and weak mobile network since they cannot get updated with the news of signaling system during a cyclone. In this union, many people are involved in multiple employments. For instance, a person is a farmer in summer (or Kharip-1) season then switches to fishing in monsoon and switches to day labor in winter afterwards (or Rabi Season).

2.6. Vulnerability of Population and Local Economy to Climatic Hazards

The vulnerability of the population includes different demographic characteristics of each individual such as male, female, children, disabled male or female. On the basis of CRA in three unions of Kutubdia (Baraghope, Uttar Dhurung and Ali Akbar Deil) overall, the below section gives an overview of local population groups' and local economy vulnerabilities in Baraghope.

For the male population, vulnerability to climatic hazards include responsibility to the family as a family head, tendency to protect the property, and leaving for the shelter center at last. For the female population, vulnerability includes responsibility toward the children management,

attachment to the home and denying to leave the house. In an emergency, long hair and sarees can cause problems in swimming. For children, vulnerabilities include inability to swim, economical dependency and lack of experience. Disable individuals are also vulnerable to a high degree since they could be unable to move without help of others during climatic hazards.

Climatic hazards include cyclones, thunderstorms, tornadoes, drought, rain, hail, temperature, air pollution. Due to these kinds of climatic hazards, the lifestyle of the population and the local economy are affected. The local economy depends on the agricultural and fishing sectors. According to the local people, the height of monthly high tide continuously increases and the embankment is not good enough to create a barrier between the sea and mainland for the protection. When saline water enters into the agricultural land, the cropland will be totally damaged. This damages the local economy and lowers the living standards of the people working in such sectors. There are only two sources of food – purchase and own production, as mentioned by the survey respondents in Baraghope Union. As in other Kutubdia unions, 90% of the total households mentioned that purchasing is their main food source, whereas only 10% of these households' food source is their own production. As most of the households' food source is purchased, this means that market access is very crucial for food security in the area. Food price hike or drop of income due to any manmade or natural disasters have immense negative impacts on the food security of the low-income groups in the union.

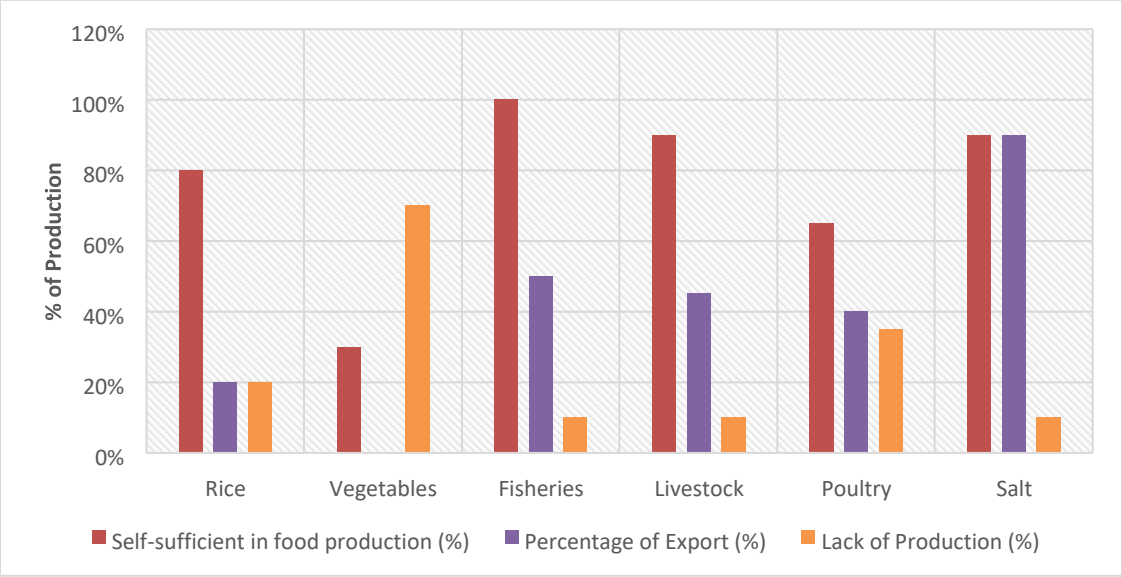

Figure 15: Food Production and Food Security (Source: CRA field data)

Based on the CRA field data, almost 90% of the households are close to the water source, i.e. within 150 feet. On the other hand, 10% of households have to collect drinking water from the source, which is more than 150 feet. The main source of drinking water is deep tube-well (95.0%) and shallow tube-well (5%) as reported by the local people. There is no other major source of drinking water in the area. It is also important to check the water quality of shallow tube-well, because it has a potential threat to be contaminated. The Bangladesh standard of safe distance between water source and nearest latrine is at least 30 feet (WFP, 2017).

The CRA survey findings showed that almost 30% of the latrine did not follow the standard, which means there is a potential risk for fecal contamination of water source. In addition, it is interesting to note that in almost 90% of the households, women, including girls and adult women, were solely responsible to collect water from source of drinking. This particular task is very gender-biased, which needs special attention to reduce the burden of women. Due to climate change, various negative impacts are visible in the Baraghope Union. The frequency of intense cyclones and storm surges has increased significantly over the past few years (Ahmed & Anwar, 2012). Irregular rainfall and increasing temperature are creating an adverse effect on the population lifestyle and in the local economy.

Chapter 3: Community Risks and Vulnerability

Risk statement of different elements of Baraghope Union with rating, sector-wise risk identification and consequences, as well as exposure and sensibility analysis with adaptive strategy will be discussed in this chapter.

3.1. Sector wise Risks and Consequences

Sector	Risk	Consequences

Agriculture	Salinity Intrusion, Water logging, Heavy rainfall are highly exposed to Rabi crops. Cyclones are also great threats to agriculture. If there will be a similar cyclone like the one that occurred in 1991, there will be a possibility of major loss of agriculture.	Food production will be hampered. Price hiking, Unemployment problem will increase.
Fishing	Cyclones with tide provides more problems to fishing. A cyclone similar to that of	Fishing business will be disrupted. Fishermen will
	1991 provides a possibility of moderate loss of in the fishing sector.	be more vulnerable.
Tourism	If a similar cyclone like the one in 2016 occurs, there will be a possibility of moderate loss in the tourism business.	Tourists will be disinterested.
Business	If a cyclone similar to the one in 1991 occurs, there is a possibility of major loss of local and export businesses.	Businessmen will face a great loss of assets and economic opportunities due to communications disruption.
Physical Elements	If a cyclone similar to the ones in 1991 and 2016 occurs there is a possibility of major loss of physical elements. If there occurred water logging like 2016, there are a possibility of moderate loss of structural elements.	Structurally these elements will weaken. Communication will be disrupted. Public life will be catastrophic.

Crop production is highly exposed to cyclones as the cyclone period happens during Ashar – Kartrik (mid-June to Mid-October) months and the time of harvesting Kharip-2 crops is during Kartrik (mid-October to mid-November) months. If a cyclone occurs during Vadra – Agrahayon (mid-August to mid-November) months, a paddy (types 28, 48, 49,tia) will be affected by major loss. Moreover, salinity intrusion and water logging during Ashar – Vadra (mid-June to mid-August) months would affect specially paddies (types 48, 28) and experience severe losses. These hazards simultaneously hamper the crop production in this union. The consequences of these risks

would be food deficiency and price hiking. Unemployment problems will increase. In Baraghope, Rabi crops are produced like cucumber, tomato, green chili, watermelon and beans. Water logging and salinity during Ashar – Agrahayon (mid-June to mid-November) would affect vegetables and fruits by moderate loss. Damage to cucumber, tomato, watermelon would not meet local demands and the consequences will be significant losses of business and price hike of vegetables.

Fishing is one of the prominent occupations in this union as Baraghope lies in the east of Bay of Bengal and west of Kutubdia Channel. Fishing folks like fisherman, boatmen, fishing businessmen, fishing boat owners and laborers comprise almost 60% of this union (according to CRA field data). Fisher folks are highly exposed to cyclones. If a cyclone occurs similar to those of 1991 and 2016, there is a possibility of experiencing severe losses. The consequences are the following:

a) Fish business will be hampered;
b) Boat owners will experience heavy damages;
c) Fish exportation will be disrupted;
d) Laborers cannot get work.

Baraghope has a potential for tourism attraction. It has a sandy beach like in Cox's Bazar, jhau forest, small villages, and its location being nearby the Kutubdia channel. Without proper promotional activities, tourism in this union will not flourish. Though a small number of tourists come here every year during winter. If climatic hazards occur every year, this sector will face severe losses. The consequences may imply bad impact to the hotel business.

Local business like bazaars, clothes shops, grocery shops, small businesses are exposed to cyclones and other big hazards. If a cyclone occurs similar to those of 1991 and 2016, there is a possibility of severe losses. Human-induced hazards like fire accidents may affect local businesses. Other hazards like salinity, water logging, rainfall may lead moderate losses. The consequences are price hike, losses for businessmen, and unemployment.

Physical elements like educational infrastructure, cyclone shelter, culvert, road, houses, stores, religious and different purpose infrastructure are highly exposed to cyclone. If a cyclone occurs similar to that of 1991, catastrophic damage of this infrastructure may take place. Embankment is damaged already. If another cyclone occurs, this embankment will be completely damaged.

Moreover, other hazards like tide, water logging and salinity will be the cause of moderate damage. The consequences are as follows:

a) Communication will be disrupted;
b) People may become homeless as cyclone shelters are also at risk;
c) Public life will catastrophic;
d) Physical element may weaken due to salinity;
e) Low land will be submerged into water most of the time due to heavy rainfall and water logging.

3.2. Risk Statements with High Priority

According to the CRA Guidelines prepared by CDMP, risks can be categorized into four stages by pair ranking consequences and likelihood, which are indicated below (CDMP, 2006).

Table 6: Risk categories

Extreme Risk	Immediate action is needed without any delay
High Risk	Immediate action needed with proper consultation
Medium Risk	Frequent observation and measures needed
Low Risk	Annual observation needed; measures could be taken

Through the field survey, the elements at risk have been identified. Which elements are more at risk and how much damage it would cause have been stated in this section. To identify the risk rating of all risk statements, consequences and likelihood are multiplied to categorize the high-rated risks among all risks of the union. Some high-rated risks are stated below:

Table 7: Risk Statements with High Priority

Elements	Risk Statement	Consequences	Risk Rating
School	If a cyclone like Roanu occurs in following years, the Omjakhali Government Primary School in Ward 4 would be severely damaged and more than 450 students would not be able to attend school.	Cannot be used as a school and cyclone shelter.	1

Embankment	If shoreline erosion and cyclone like Gorky occur, embankment of western shoreline in Ward 6 would be severely damaged and settlements, agriculture, salt fields and other institutions would be at stake due to embankment failure	The whole area will go down.	2
Road	The road of West Mogdail in Ward 2 would be severely damaged if a cyclone like Roanu occurs again.	There is a great possibility that the infrastructure will fall down.	3
School	If a cyclone like Roanu and storm surge occur, the Pilotkhana Government Primary School in Ward 7 would be severely damaged and more than 300 students would not be able to go to school.	Normal activities of the school may be disrupted.	4

Madrasha	Baraghope Islamia Fazil Degree Madrasha in Ward 1 would be severely damaged if a heavy rainfall occurs. Due to the heavy rainfall in 2016, the institution faced severe water logging problems.	Normal activities of school may be disrupted.	5
School	If a cyclone like Roanu occurs in the next years, Shiraj Nahar School in Ward 6 would be severely damaged.	Normal activities of school may be disrupted.	6
School	If a cyclone like Roanu occurs in the next years, the Madina Pre-Cadet School in Ward 2 would be severely damaged and more than 300 students would not be able to attend school.	Normal activities of school may be disrupted.	7
School	If a cyclone like Roanu occurs in the next years, Majeda Kindergarten School in Ward 2 would be moderately damaged and more than 200 students would not be able to attend school.	Communication will be disrupted.	8
Sluice Gate	The Sluice gate in Ward 4 was broken after cyclone Gorky and a two-meter tide occurred twice every month. If a tidal surge like cyclone Roanu occurs, it would not be able to control the tide water intrusion. Hence, people living here will not be able to work on their paddies due to salt water intrusion.	Water will not pass.	9

Sluice Gate	The Sluice gate in Ward 4 was broken after cyclone Gorky and a two-meter tide occurred twice every month. If a tidal surge like cyclone Roanu occurs, it would not be able to control the tide water intrusion. Hence, people living here will not be able to work on their paddies due to salt water intrusion.	Water will not pass.	10
Madrasha	Hafezia Jalaluddin Madrasha in Ward 5 would be moderately damaged if a cyclone like Roanu occurs - more than 400 students would not be able to attend school	Normal activities of madrasa may be disrupted.	11
Cluster Village	Due to poor structure and consecutive natural disasters, the settlements of Omjakhali village of Ward 6 were severely damaged by cyclone Roanu. If a cyclone like Roanu and high tide occur in Ward 6, these settlements would be completely damaged and about 800 people would lose their households.	Village houses and crops will be destroyed.	12
School	If a cyclone like Roanu occurs in following years, Monohor Kali Government Primary School in Ward 9 would be severely damaged and more than 400 students would not be able to attend school.	There will be infrastructural damage.	13
Madrasha	If a cyclone like Roanu occurs in following years, Fotepara Forkania Madrasha in Ward 8 would be severely damaged following severe inundation problems.	Infrastructural damage.	14
Market	If a fire occurs in Biddyut Market of Ward 5, the market would be moderately damaged and more than 100 shops would be burnt and will face livelihoods losses.	The traders will suffer financial loss.	15
Library	If a cyclone like Roanu occurs in the next years, Kutubdia Public Library in Ward 1 would be severely damaged.	Normal activities of madrasa may be disrupted.	16
Cluster Village	Due to poor structure and consecutive natural disaster, the settlements of North Baraghope Village in Ward 8 was severally damaged by cyclone Roanu. If a cyclone like Roanu and high tide occur in the Ward 2, these settlements would be completely damaged and about 1000 people would lose their households.	Normal activities of the school may be disrupted. Furniture and infrastructure will be damaged.	17

Food Warehouse	If a cyclone like Roanu occurs, food warehouse in Ward 7 would be severely Damaged.	There will be a massive loss of food.	18
Cyclone Shelter	If a cyclone like Gorky occurs in this area, the Brac Cyclone Shelter Ward 9 would be severely damaged and more than 800 people would not take shelter in the emergency period.	The necessary items including furniture may be damaged.	19

3.3. Sensitivity and Exposure Analysis

Table 8: Sensitivity and Exposure Analysis

Elements	Risk Statement	Exposure to Hazards	Key Components	Sensitivity 1	Sensitivity 2	Sensitivity 3
School	If a Cyclone like Roanu occurs in following years, the Omjakhali Government Primary School in Ward 4 would be severely damaged and more than 450 students would not be able to attend school.	Cyclone Storm Surge	Furniture	Highly sensitive to water	Perishable	Storage Environment
			Wood	Highly sensitive to water	Less strength	
			Brick	Quality	Base materials	Stability
			RCC	Materials	Construction Quality	
			Sn Sheet	Highly sensitive to Water	Highly Corrosion Prone	
Embankment	If shoreline erosion and cyclone like Gorky occurs, embankment of western shoreline in Ward 6 would be severely damaged. Settlements, agriculture, salt fields and other institutions would be at stake due to embankment failure.	Storm Surge Tidal Flood Erosion	Brick (Guide wall)	Quality	Base materials	Stability
			Soil	Cohesion	Soil type	Soil texture
Road	The Road of West Mogdail in Ward 2 would be severely damaged if a cyclone like Roanu occurs again.	Storm Surge Tidal Flood Erosion	Brick (Guide wall)	Quality	Base materials	Stability
			Soil	Cohesion	Soil type	Soil texture

School	If a cyclone like Roanu and storm surge occur, the Pilotkhana Government Primary School in Ward 7 would be severely damaged and more than 300 students would not be able to attend school.	Cyclone Storm Surge Tidal Flood	Furniture	Highly sensitive to Water	Perishable	Storage Environment
			Wood	Highly sensitive to Water	Less strength	
			Brick	Quality	Base materials	Stability
			RCC	Materials	Construction Quality	
			Sn Sheet	Highly sensitive to Water	Highly Corrosion Prone	
Madrasha	Baraghope Islamia Fazil Degree Madrasha in Ward 1 would be severely damaged if a heavy rainfall occurs. Due to the heavy rainfall in 2016, the institution faced severe waterlogging problems.	Cyclone Storm Surge Tidal Flood	Furniture	Highly sensitive to Water	Perishable	Storage Environment
			Wood	Highly sensitive to Water	Less strength	
			Brick	Quality	Base materials	Stability
			RCC	Materials	Construction Quality	
			Sn Sheet	Highly sensitive to Water	Highly Corrosion Prone	
School	If a cyclone like Roanu occurs in next years, the Shiraj Nahar School in Ward 6 would be severely damaged.	Cyclone Storm Surge	Furniture	Highly sensitive to Water	Perishable	Storage Environment
			Wood	Highly sensitive to Water	Less strength	
		Tidal Flood	Brick	Quality	Base materials	Stability
			RCC	Materials	Construction Quality	
			Sn Sheet	Highly sensitive to Water	Highly Corrosion Prone	
School	If a cyclone like Roanu occurs in next years, the Madina Pre-Cadet School in Ward 2 would be severely damaged and more than 300 students would not be able to attend school.	Cyclone Storm Surge	Furniture	Highly sensitive to Water	Perishable	Storage Environment
			Wood	Highly sensitive to Water	Less strength	

		Tidal Flood	Brick	Quality	Base materials	Stability
			RCC	Materials	Constructi on Quality	
			Sn Sheet	Highly sensitive to Water	Highly Corrosion Prone	
School	If a Cyclone like Roanu occurs in next years, the Majeda Kindergarten School in Ward 2 would be moderately damaged and more than 200 students would not be able to attend school.	Cyclone Storm Surge Tidal Flood	Furnitur e	Highly sensitive to Water	Perishable	Storage Environme nt
			Wood	Highly sensitive to Water	Less strength	
			Brick	Quality	Base materials	Stability
			RCC	Materials	Constructi on Quality	
			Sn Sheet	Highly sensitive to Water	Highly Corrosion Prone	
Sluice Gate	The Sluice gate in Ward 4 was broken after cyclone Gorky and a two-meter tide occurred twice every month. If a tidal surge like cyclone Roanu occurs, it would not be able to control the tide water intrusion. Hence, people living here will not be able to work on their paddies due to salt water intrusion.	Cyclone Storm Surge Tidal Flood	RCC	Materials	Constructi on Quality	
			Brick	Quality	Base materials	Stability
			Base Soil	Cohesion	Soil type	Soil texture
Sluice Gate	The Sluice gate in Ward 4 was broken after cyclone Gorky and a two-meter tide occurred twice every month. If a tidal surge like cyclone Roanu occurs, it would not be able to control the tide water intrusion. Hence, people living here will not be able to work on their paddies due to salt water intrusion.	Cyclone Storm Surge Tidal Flood	RCC	Materials	Constructi on Quality	
			Brick	Quality	Base materials	Stability
			Base Soil	Cohesion	Soil type	Soil texture

Madrasha	The Hafezia Jalaluddin Madrasha in Ward 5 would be moderately damaged if a cyclone like Roanu	Cyclone	Furnitur e	Highly sensitive to Water	Perishable	Storage Environme nt

	occurs - more than 400 students would not be able to attend school.	Storm Surge Tidal Flood	Wood	Highly sensitive to Water	Less strength	
			Brick	Quality	Base materials	Stability
			Sn Sheet	Highly sensitive to Water	Highly Corrosion Prone	
Cluster Village	Due to poor structure and consecutive natural disaster, the settlements of Omjakhali village of Ward 6 were severally damaged by cyclone Roanu. If cyclone like Roanu and high tide occur in the Ward 6, these settlements would be completely damaged and about800 people would lose their households.	Cyclone Storm Surge Tidal Flood	Furniture	Highly sensitive to Water	Perishable	Storage Environment
			Wood	Highly sensitive to Water	Less strength	
			Brick	Quality	Base materials	Stability
			RCC	Materials	Construction Quality	
			Sn Sheet	Highly sensitive to Water	Highly Corrosion Prone	
School	If a cyclone like Roanu occurs in the next years, Monohor Kali Government Primary School in Ward 9 would be severely damaged and more than 400 students would not be able to attend school.	Cyclone Storm Surge Tidal Flood	Furniture	Highly sensitive to Water	Perishable	Storage Environment
			Wood	Highly sensitive to Water	Less strength	
			Brick	Quality	Base materials	Stability
			Sn Sheet	Highly sensitive to Water	Highly Corrosion Prone	
Madrasha	If a cyclone like Roanu occurs in the next years, the Fotepara Forkania Madrasha in Ward 8 would be severely damaged following severe inundation Problems.	Cyclone Storm Surge Tidal Flood	Furniture	Highly sensitive to Water	Perishable	Storage Environment
			Wood	Highly sensitive to Water	Less strength	
			Brick	Quality	Base materials	Stability
			Sn Sheet	Highly sensitive to Water	Highly Corrosion Prone	

Market	If a fire occurs in Biddyut Market of Ward 5, the market would be moderately damaged and more than 100 shops would be burnt and will face livelihoods losses.	Cyclone Storm Surge Tidal Flood	Goods	Highly sensitive to Water	Perishable	Storage Environment
			Wood	Highly sensitive to Water	Less strength	
			Brick	Quality	Base materials	Stability
			RCC	Materials	Construction Quality	
			Sn Sheet	Highly sensitive to Water	Highly Corrosion Prone	
Library	If a cyclone like Roanu occurs in the next years, the Kutubdia Public Library in Ward 1 would be severely damaged.	Cyclone Storm Surge Water logging	Books	Highly sensitive to Water	Perishable	Storage Environment
			Wood	Highly sensitive to Water	Less strength	
			Brick	Quality	Base materials	Stability
			RCC	Materials	Construction Quality	
Cluster Village	Due to poor structure and consecutive natural disaster, the settlements of North Baraghope Village in Ward 8 was severely damaged by cyclone Roanu. If a cyclone like Roanu and high tide occur in Ward 2, these settlements would be completely damaged and about 1000 people would lose their households.	Cyclone Storm Surge Tidal Flood Water logging	Furniture	Highly sensitive to Water	Perishable	Storage Environment
			Wood	Highly sensitive to Water	Less strength	
			Brick	Quality	Base materials	Stability
			RCC	Materials	Construction Quality	
			Sn Sheet	Highly sensitive to Water	Highly Corrosion Prone	
Food Warehouse	If a cyclone like Roanu occurs, The food warehouse in Ward 7 would be severely damaged.	Tidal Flood Water logging	Goods	Highly sensitive to Water	Perishable	Storage Environment
			Brick	Quality	Base materials	Stability
			RCC	Materials	Construction Quality	

Cyclone Shelter	If a cyclone like Gorky occurs in this area, the Brac Cyclone Shelter Ward 9 would be severely damaged and more than 800 people would not take shelter in the emergency period.	Cyclone	Furniture	Highly sensitive to Water	Perishable	Storage Environment
		Storm Surge Tidal Flood Water logging	Wood	Highly sensitive to Water	Less strength	
			Brick	Quality	Base materials	Stability
			RCC	Materials	Construction Quality	
			Sn Sheet	Highly sensitive to water	Highly prone to corrosion	

3.4. Adaptive Capacity

As Baraghope is a hazard-prone area, local people trained themselves to be ready for any disasters. Thus, they are able to survive in adverse situations. That is the extent of their adaptive capacity. The storage of food and water is a challenging issue during hazard periods. This is everyone's main concern. Local people prefer to use polythene to preserve dry food, crop and precious things. Some of them use plastic containers to preserve drinking water. Some prefer to use fitkiri (local term for potassium alum). Some of them drink high-land tube-well water, which is available in the center of Baraghope union. Farmers cut off their crop production, if possible, before harvest time and drill holes in the ground to preserve. Salt farmers follow the same technique. They keep salt in the hole at the corner of the field so that they can use it after disasters.

Fishing boat owners submerged their boats under water during disasters so that their boats remain danger-free. People who have ponds and cultivate fish place nets over the pond so that the fish do not float away during disasters. Fishing folks who catch fish in the sea during hazardous periods take some precautions like carrying a radio, dry food, life jacket, and medicines. In addition, they train themselves first to keep pace with the waves in the turbulent sea. They are dependent on their instinct and idea as well.

Before going to the cyclone shelter, people who have semi-pucka house tie their roof with sturdy ropes in order to avoid losing them due to heavy winds. Since there is no electricity in Baraghope, local people cannot watch television and cannot train themselves according to government

instructions. They mostly depend on radio. The population adapts accordingly during difficult situations.

Chapter 4: Risk Reduction Options and Action Plans

In this chapter, Risk Reduction Options and Risk Reduction Action Plan would be discussed focusing the activities and how and where would it be done.

4.1. Risk Reduction Options

There are many risks in Baraghope union as the embankment is vulnerable. The Bay of Bengal lies in the west and Kutubdia channel lies in the east of Baraghope union. Because of this geographical location, Baraghope union is exposed to many risks. The risk reduction options would be:

i. Embankment Repair
ii. Increasing Embankment Height up to 30 feet
iii. Protecting Embankment by Concrete Block
iv. Increasing Electricity Power Generation
v. Installing Geotube in Seaside of the embankment in the way that ocean current first hits the Geotube
vi. Repairing Sluice Gates
vii. Repairing old Cyclone Shelters
viii. Vertical Extension of Cyclone Shelter
ix. Mangrove Plantation
x. Saline Tolerant Crop Production
xi. Embankment cum Road Construction
xii. Increasing the height of Homestead
xiii. Improving the Communication System and Developing Tourist Attraction in Beaches

4.2. Risk Reduction Action Plan

The risk reduction action plan was made by the participatory processes of CRA and was validated in both the Union workshop by the Chairman and Members and Upzila Workshop by the UNO and Disaster Management Committee Members.

Table 9: Risk Reduction Action Plan of Baraghope Union

Serial	List of jobs that can be locally implemented	Who will do it	When will it be done	How will it be done	Where will it be done	Estimated cost	Other Considerations
1	Embankment Repair	Bangladesh Water Development Board (BWDB)/ Local Government Engineering Department (LGED)	2019-2020	Participation with local people. Ensure Slope and Toe Protection	1. Omjakhali in Ward 4 2. Muralia in Ward 6 3. Azam Colony in Ward 7	N/A	Labor force must be collected locally
2	Increasing Embankment Height upto 30 feet	Bangladesh Water Development Board (BWDB)/ Local Government Engineering Department (LGED)	2019-2020	Participation with local people. Ensure Slope and Toe Protection with required width as height increases	1. Omjakhali in Ward 4 2. Muralia in Ward 6 3. Azam Colony in Ward 7	N/A	Labor force must be collected locally
3	Protecting Embankment by Concrete Block	Bangladesh Water Development Board (BWDB)/ Local Government Engineering Department (LGED)	2019-2020	Participation with local people. Ensure Slope and Toe Protection	1. Omjakhali in Ward 4 2. Muralia in Ward 6 3. Azam Colony in Ward 7	N/A	Labor force must be collected from local people. Not to use locally available sands for construction as sand is saline and it would affect the integrity of the structure

4	Increasing Electricity Power Generation	Bangladesh Power Development Board (BPDB), Ministry of Power, Energy and Mineral Resources (MPEMR), Bangladesh Power Division, Upazila Parishad	2019-2020	Participation with local People. Ensuring sustainability and durability of electricity supplies	1. Power Station in Ward 1	N/A	

5	Installing Geotube in Seaside of the Embankment in the way that ocean current first hits the geotube	Bangladesh Water Development Board (BWDB)/ Local Government Engineering Department (LGED)	2019-2020	Participation with local People. Using locally available resources (sand). Ensuring the high quality of geobag material	1. Omjakhali in Ward 4 2. Muralia in Ward 6 3. Azam Colony in Ward 7	N/A	Labor force must be collected from local people. Use locally available construction materials.
6	Repairing Sluice Gates	Upazila Parishad, Bangladesh Water Development Board (BWDB), Development Partners	2019-2020	Ensure the conveyance capacity of the flood flow. Proper Monitoring of opening and closing the gate.	1. Omjakhali Sluice Gate in Ward 4 2. Muralia Sluice Gate in Ward 6	N/A	Not to use locally available sands for construction as sand is saline and it would affect the d of the structure
7	Repair old Cyclone Shelters	Upazila Parishad, Local Government Engineering Department (LGED), Ministry of Disaster Management and Relief (MoDMR), Government/ Non-Government Organization	2019-2020	Basement and plinth protection and repairing the concrete beams and columns of the building. Increase the basement height. Ensure regular maintenance.	1. Cyclone Shelter Beside Muralia Stadium in Ward 5 Food Godown cum Shelter in Ward 7	N/A	Not to use locally available sands for construction as sand is saline and it would affect the durability of the structure

				Multipurpose uses of Shelters.			
8	Vertical Extension of Cyclone Shelter	Upazila Parishad, Local Government Engineering Department (LGED), Ministry of Disaster Management and Relief (MoDMR), Government/ Non-Government Organization	2019-2020	Capitalizing on the remaining buildable space characteristic of many cyclone shelters. At the same time, refurbishing the housing block and improving standards of	. Kutubdia Model Government Primary School in Ward 1 1. Omjakhali Government Primary School in Ward 4 2. Kazi Helal Uddin Government Primary School in Ward 5	N/A	Not to use locally available sand for construction as sand is saline and it would affect the durability of the structure
				efficiency, safety and accessibility			
9	Mangrove Plantation	Bangladesh Forest Department, Ministry of Environment, Forest and Climate Change (MOEF), Department of Environment (DoE), Bangladesh Forest Industries Development Corporation (BFIDC), Upazila Parishad, NGOs, Development Partners	2019-2020	Local participation in coastal greenbelt management. Ensure long-term maintenance and inter-sectoral coordination. Integrating community-based adaptation into afforestation and	1. 2. Western Part of Ward 2 and Ward 3 Eastern Part of Ward 4 and Ward 7	N/A	Labor force must be collected from local. Enhancing socioeconomics benefits to local communities from the forests

				reforestation			
10	Saline Tolerant Crop Production	Bangladesh Agricultural Development Corporation (BADC), Ministry of Agriculture (MoA), Department of Agricultural Extension (DAE), Krishi Gobeshona Foundation (KGF), Upazila Parishad	2019-2020	Use local labour. Ensure sustainability and productivity. Using early rainfall before monsoon for cultivation and irrigation	1. Introducing Saline tolerant Crops for the farmers of Ward 4, 5, 6, 7, 9	N/A	Ensure food and nutrition security for the people of coastal area
11	Embankment cum Road Construction	Bangladesh Water Development Board (BWDB)/ Local Government Engineering Department (LGED), Upazila Parishad, Development Partners	2019-2020	Use local labour, locally available soil and other materials. Ensure sustainability. Increase the height of the road	1. Omjakhali in Ward 4 2. Muralia in Ward 6 3. Azam Colony in Ward 7	N/A	Labor force must be collected from local people. Use locally available construction materials.
12	Increasing height of Homestead	Upazila Parishad, Government/ Non-Government Organization	2019-2020	Use local labor, locally available soil and other materials. Ensure sustainability. Ensure the settlement height is the higher than	1. Households of cluster villages of Omjakhali in Ward 4 2. Households of cluster villages of Muralia in Ward 6 and Ward 7	N/A	Labor force must be collected from local people. Use locally available construction materials.

				100-year return period inundation			
13	Improving Communication System and Developing Tourist Attraction in Sea Beach	Ministry of Civil Aviation and Tourism (MoCAT), Bangladesh Water Development Board (BWDB), Local Government Engineering Department (LGED), Upazila Parishad, Development Partners	2019-2020	Use local labor, locally available soil and other materials. Ensure sustainability. Increasing accommodation facility and food facility	1. Communication and Accommodation Facility in Ward 1	N/A	Enhancing socioeconomics benefits to local communities from tourism

Chapter 5: Concluding Remarks

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 risk faced by those living in Baraghope Union in Kutubdia, the community members are now provided with information that they have compiled themselves about the risk experienced in this union. The study conducted was participatory in design, incorporating community members into the survey team, thus providing primary information gathered in the field with people who actually live with these risks. The findings presented in this report are intended as a guide in addressing the risk reduction imperatives identified during the community-based risk assessment in Baraghope Union, in order to prevent and mitigate hazards and to reduce the vulnerability. According to the local people, key informants, and respective Government organization and other stakeholders, this union is mostly vulnerable to cyclone, storm surge, tidal flood, and salinity. Moreover, the magnitude of those hazards become greater because of the poor maintenance of embankments and its geographic location. Therefore, the high salinity condition in agriculture is less significant as people are only dependent on salt cultivation and shrimp farming. The dependency on highly vulnerable income sources prove to threaten the lives and livelihoods. In addition, poor infrastructure and build structure in vulnerable places make the resources increasingly 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 development planning, as well as predicting the outcomes by modeling multi-hazard scenarios for the Upazila can make development works more sustainable in the future.

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Annex A: 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

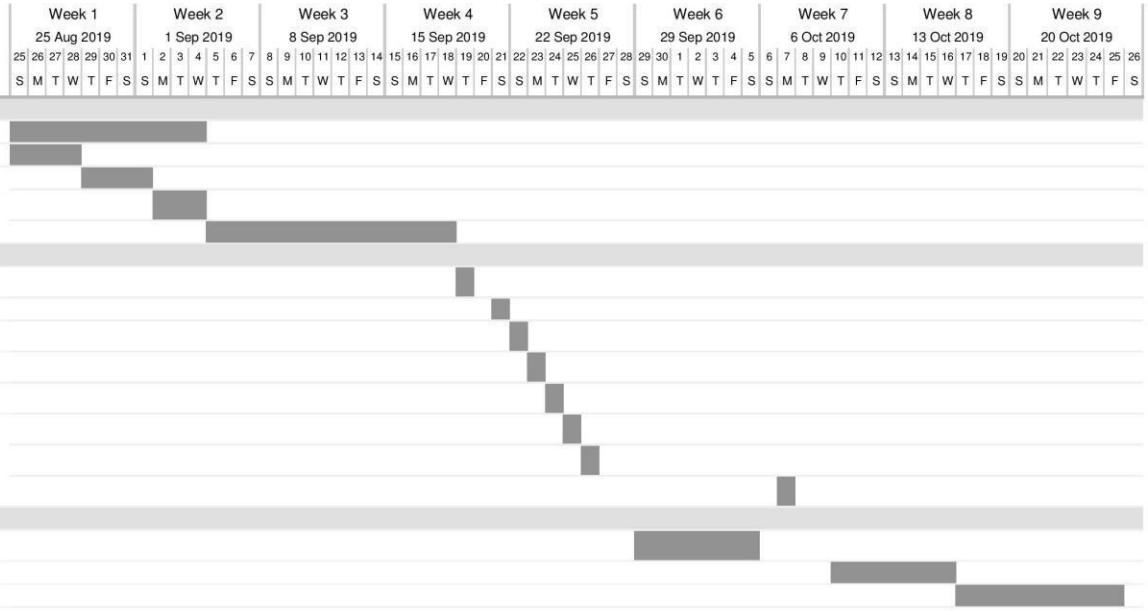

Figure 16: Schedule of map and CRA production

Annex B: 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 sociotechnical systems related to agriculture, food processing and storage, communications, industrial sites, infrastructure and transportation)

The Focus Group Discussion was conducted on 22 September, 2019. FGD is done consisting of an 8 to 10 people group.

Table 10: List of FGDs

FGD No	Community	Location	Ward No	Number of Participants
1	Farmers	Mogdeil	5	10
2	Labor community	Jetty ghat	7	9
3	Salt farmers	Muralia	6	10

4	Different occupational people	Miarpara	9	8
5	People occupied in different services	North Baraghope	1	8
6	Women Community	Romaipara	3	10
7	Unprivileged people group	Azam Colony	8	8
8	Rural market/shop owners	Baraghope Bazar	2	10
9	Hatchery and fishery owner / fisher folks	Omjakhali	4	10

Annex C: 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

The Key Informant Interviews was conducted on 23 September, 2019.

Table 11: List of KIIs

KII No	Name	Designation	Date Interviewed
1	A. N. M. Shahiduddin Choton	Chairman, Baraghope	23 September, 2019
2	Delowar Hossain	Secretary, Baraghope	23 September, 2019
3	Jahir Uddin	Headmaster, Kutubdia Adarsha High School	23 September, 2019
4	Laila Begum	Reserved Seat Member of Ward 1,2,3	23 September, 2019
5	Sharmin Akter Urmi	Reserved Seat Member of Ward 4,5,6	23 September, 2019
6	Nurul Alam	Principal, Baraghope Islamia Fazil Degree Madrasha	23 September, 2019

Annex D: Photos of Field Study Area

The photos were taken throughout the CRA process conducted from 21 September, 2019 to 26 September, 2019

Figure 17: Vulnerable food godown in ward 7

Figure 18: Broken sluice gate in ward 6

Figure 19: Vulnerable building in ward 5

Figure 20: cluster villages beside embankment

Figure 21: Large group discussion in Union parishad meeting room

Figure 22: Primary school cum cyclone shelter

Figure 23: Broken part of the embankment in ward 6

Figure 24: Broken part of the embankment in ward 6


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