Community Risk Assessment

Hoanak Union, Maheshkhali, Cox's Bazar

November 2019

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Chapter 1. Introduction

Disaster risk is defined as the likelihood of damage, destruction, injury and loss of life resulting from natural disasters, other hazards, the vulnerability of households exposed to them or the interaction between such factors. Disaster risk reduction refers to all policies, actions and initiatives that can be taken to minimize disaster risks and vulnerabilities, including improving the capacity for disaster prevention, mitigation and preparedness. A community risk assessment is a fundamental step in any developmental approach to disaster risk reduction, informing the design of development measures that are grounded in local risk dynamics with a view to ensuring sustainable development and service delivery programs. The local community is the frontline of disaster management and they have a better knowledge of key risk information and the suitability of certain risk reduction strategies. Therefore, the main purpose of the Community Risk Assessment (CRA) is to put local communities at the center of risk and vulnerability identification, thereby affording ownership and control of the continuous risk assessment process to the local population.

Hoanak union has a complex geophysical characteristic with salinization and a costal area prone to storm-surges and flash floods as well as landslide-prone hilly areas. The union experienced the historically devastating cyclone Gorky in 1991 and every year its inhabitants are affected by different types of natural disaster such as landslides, flash-floods, cyclone storm-surges and tidal floods. This union was selected for the CRA after it was identified by the District administration as a high-risk area facing multiple socio-economic problems. The objective of the CRA was to determine the elements at risk to natural hazards and identify a suitable risk reduction strategy to minimize those risks.

The CRA employs a methodology which has been specifically designed to engage local communities in disaster risk reduction and adaptation interventions. In this study, we have followed the Community Risk Assessment Guideline developed by the Comprehensive Disaster Management Programme (CDMP). It provides insights into how local risks are generated and can be reduced. It is an approach that aims to empower the community by involving them in defining problems, decision-making, implementation of appropriate interventions and evaluation of the results of these

interventions. It acknowledges that risk reduction efforts will necessarily vary from one community to another because of the unique geophysical, historical and socio-economic conditions.

The Community Risk Assessment is generally comprised of 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 Hoanak Union

Maheshkhali is a coastal hilly island Upazila of Cox's Bazar Zila in the Chittagong Division. In 1982 it was upgraded to the Upazila administrative level (BBS, 2011). With its diversified cultural makeup and range of natural resources, this Upazila is becoming one of the most important tourist spots and development zones. The Maheshkhali Channel separates the island from the mainland and Cox’s Bazar Sadar. The Upazila occupies an area of 362,18 km^2, including 57,47 km^2 of forest. It is located between 21°28' and 21'-'46' north latitudes and between 91'-'51' and 91'-59' east longitudes (BBS, 2011; Field Survey, 2019; UP, 2019) (BBS, 2011; Field Survey, 2019; UP, 2019). Maheshkhali is the only hilly island in Bangladesh with dversified geomorphological characteristics.

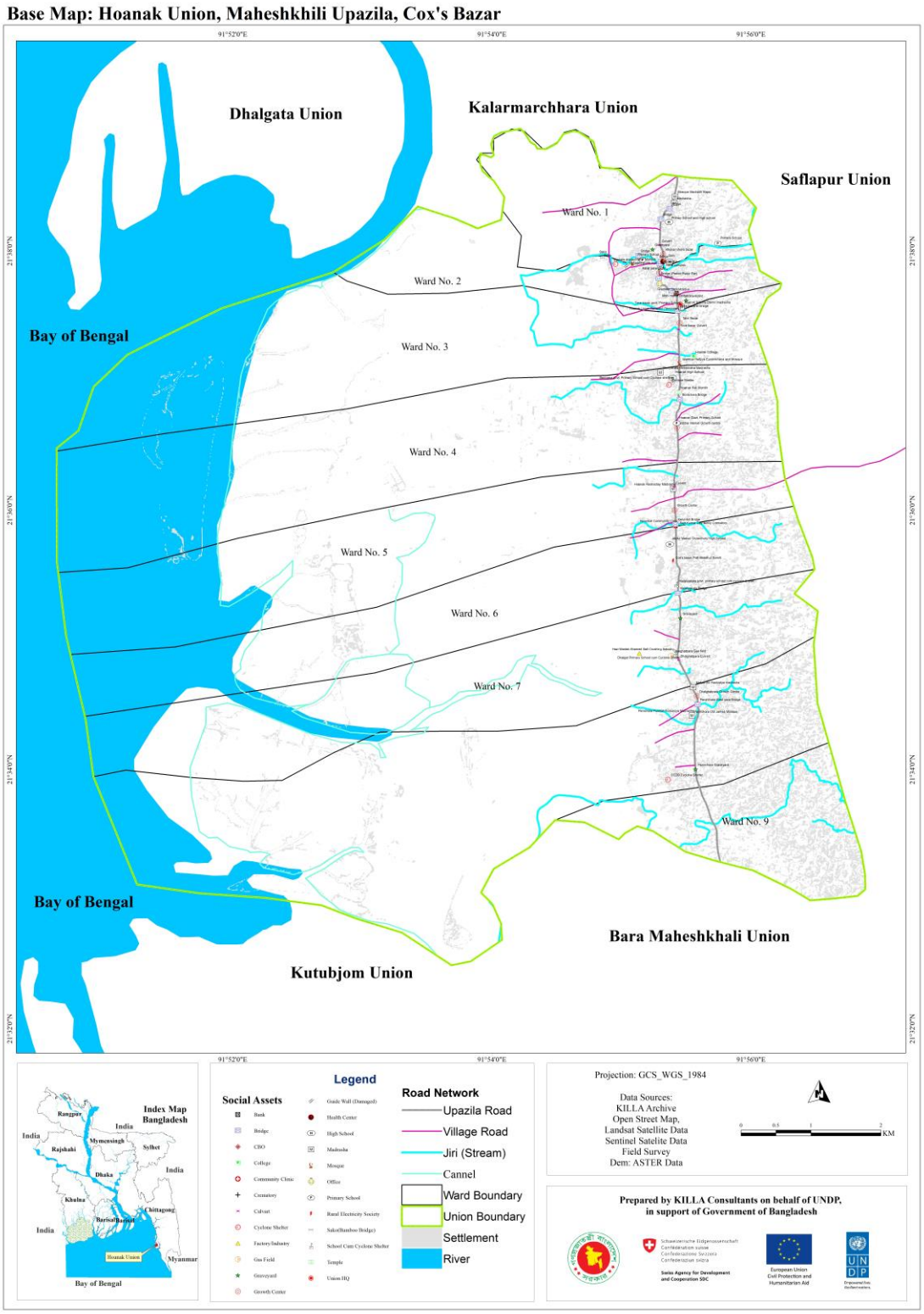

Figure 1: Base Map, Hoanak Union

Around 1800 AD, the tribe 'Rakhine' (also known as the 'Mogs') came here, mainly from China, to establish settlements. According to legend, the first person to come here was 'Hoa Mog' and then the others followed him. The place is named after 'Hoa Mog' as Hoanak. Later, Muslims from the adjacent Upazila immigrated and established permanent settlements. It is also thought that the name Hoanak came from the local word 'Hoan' which means 'Equal' as the union is located almost at the center of the island Maheshkhali (BBS, 2011; UP, n.d.).

Hoanak Union situated in Maheshkhali Upazila in Cox's Bazar District embedded by Kalarmarchhara Union and Dhalghata Union in the north, the Bay of Bengal in the west, Bara Maheshkhali and Kutubjom Union in the south and Saflapur Union in the east. The Union occupies an area of 38 km² and has nine wards.

1.2. Demographic Information

Hoanak Union has a total population of 51,587 inhabitants (26,515 males and 25,072 females). The total number of households is 9,373. The union is comprised of 4 Mouzas and 28 villages. The population density of the union is 1,386 persons per square kilometer. The literacy rate of Hoanak union is 31.1 percent (BBS, 2011).

The graph below presents the number of males and females living in different villages across the Hoanak union. Rajghorghona has the highest population amongst the areas

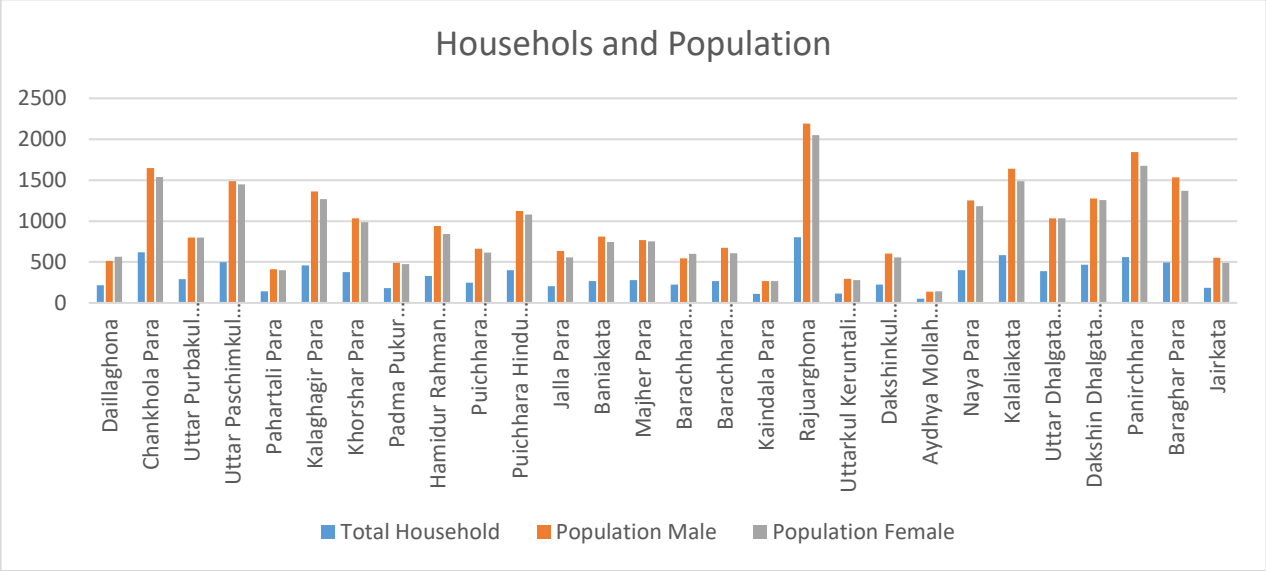

Figure 2 Number of household and Male-Female population by villages (BBS, 2011)

comprising the union. Panirchhara, Kalaliakata, Chhonkhola Para and Baraghar Para are the most populous in comparison to other areas. As shown in the graph, the distribution of men and women is quite uniform across all areas.

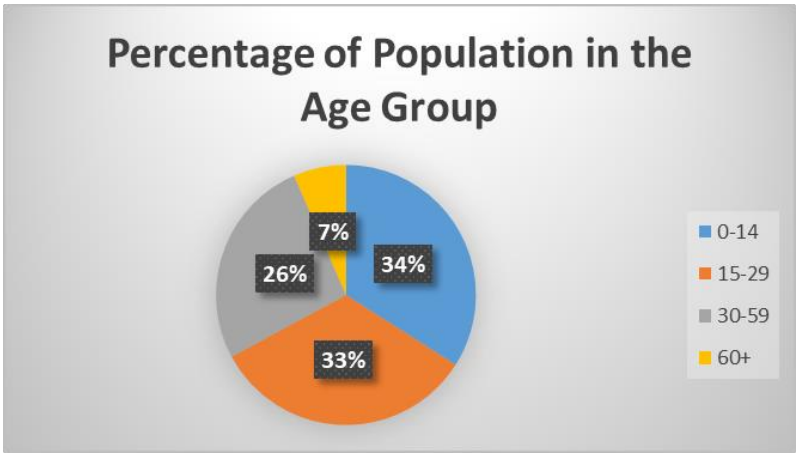

Figure 3 Age group distribution of Hoanak union (BBS, 2011)

***Age Group Population*:** 33 percent of the population is aged between 15 and 29 whilst 26 percent of the population is aged between 30 and 59. Thus, a majority of the population of this union is young or middle aged, capable of hard work and to participate in economic activity. 34% population are children aged between 0 to 14. Only 7 percent of the population are older than 60, considered dependent on others for assistance in day-to-day activities. The overall population trend is one of high birth rates and possibly decreasing mortality rates, which is associated with the rapid increase in population over the last few decades (BBS, 2011).

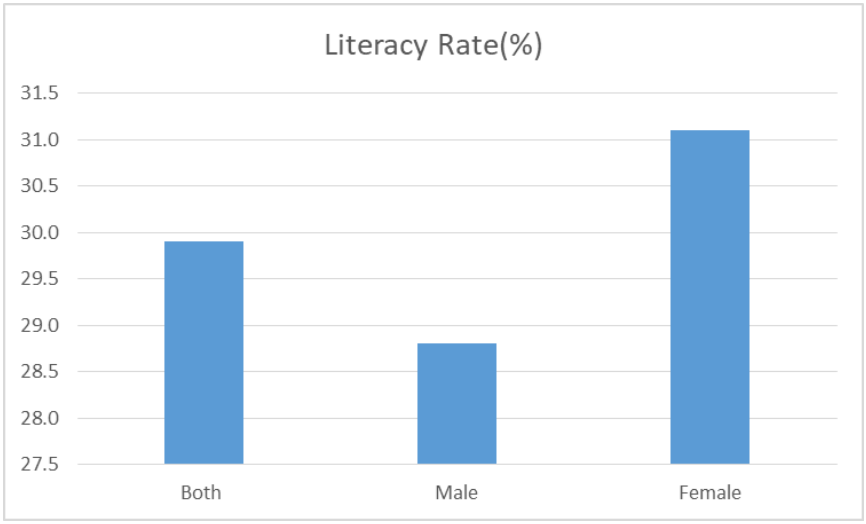

Figure 4 Literacy rate by Gender (BBS, 2011)

1.3. Socio-Economic Conditions

Frequent natural disasters, extreme climate events and climate change have a considerable impact on the life and livelihood of the people in Hoanak Union. Based on economic wellbeing, 20 percent of the population live in extreme poverty, 40 percent are poor, 30 percent belong to the middle class and the remaining 10 percent are wealthy. Most of the extremely poor population live in the hilly areas of the union illegally as a result of not owning the land they inhabit.

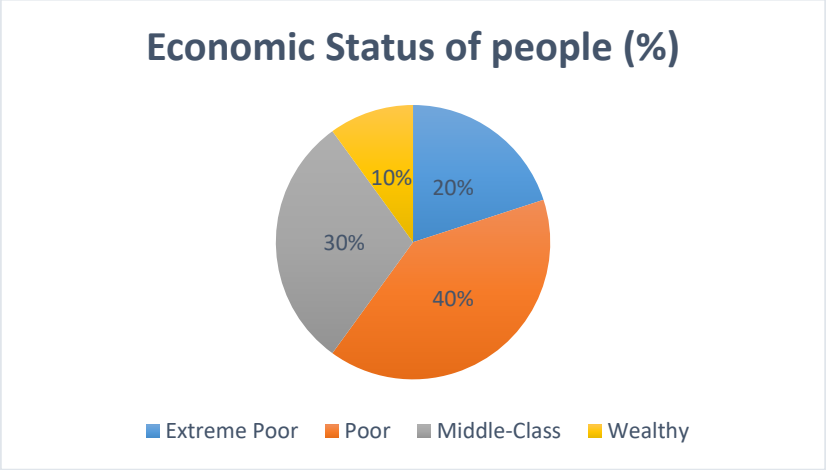

Figure 5: Economic Status of people (%) (Field Survey, 2019)

***Literacy rate*:** About 29.9 percent of the population are educated in the union wherein28.8 percent of males and 31.1 percent of females are educated. These statistics indicate that females are more likely to get an education than males in this union. This could come about as males are employed to work in agriculture and earn money to contribute to the family at a much younger age than females as it is thought to be more economically beneficial for the family by the general public of the union.

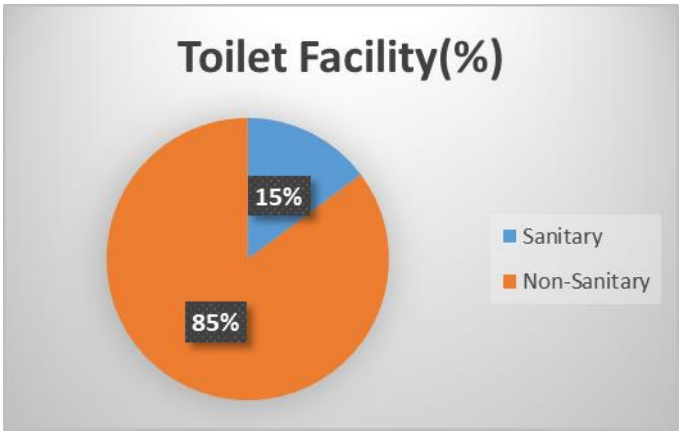

Figure 6 Toilet facilities of Hoanak union (BBS, 2011)

Access to sanitary toilets: Around 15 percent of toilets in the Union are considered sanitary, the remaining 85 percent are non-sanitary. Most of the non-sanitary toilets are belong to the households located in the hilly areas. In general, almost all of the families living in the hilly areas of the union live below the poverty line.

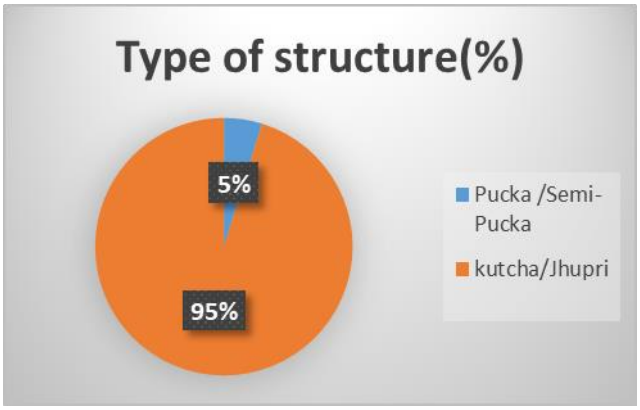

Figure 7 Types of structure (BBS, 2011)

Type of housing: About 95 percent of houses in the Union are katcha and only 5% are pucca or semi-pucca. Most of the pucca houses are located in areas outside of the hilly regions and close to the main road.

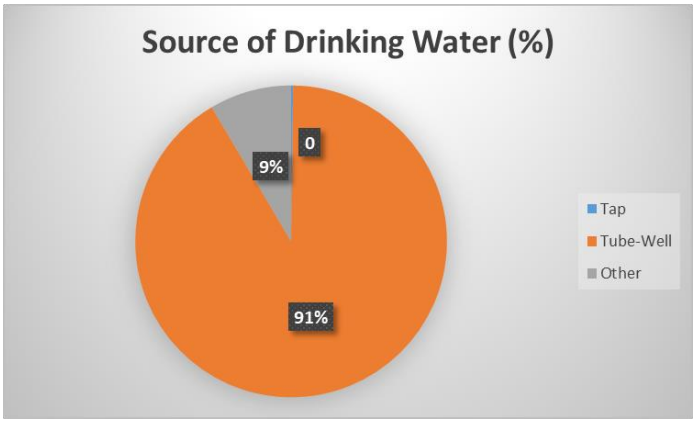

Figure 8 Sources of drinking water (BBS, 2011)

Source of Drinking Water: 91 percent of the population in the Union use shallow tube wells as their main source of drinking water. The remaining 9 percent collect their drinking water from other natural sources such as pond and streams.

The available means to make a livelihood is shrinking day by day due to climate change uncertainties, natural disasters and the anthropogenic intervention by the Government and the local population. The reason behind a great portion of the poverty in the Union may be the presence of frequent hazards. Frequent cyclones and tidal floods causes severe damage to agricultural lands. As the main source of income for the population is related to agriculture, shrimp cultivation and salt cultivation, damage to these sectors cause a great harm to the economy of the region and individual households alike.

The densely populated Hoanak Island on the southeast coast of Bangladesh, just north of the town of Cox's Bazar, was selected as the site for several projects such as the power plant Economic Zone. Alongside these power plants there are several economic activities around the Maheshkhali. The Bangladesh Economic Zone Authority (BEZA) has proposed the acquisition of 19,000 acres of land for the development project. Half of this land would be administrated by BEZA and the other half by four government organizations for the construction of a coal power plant and LNG terminal. However, local people claim that BEZA has already acquired more than 27,000 acres of lands. Several development projects have been shifted to the Maheshkhali, including a proposed deep sea port development. Supposedly, the national government is positioning these places as hubs of power generation and economic activity (Japan International Cooperation Agency(JICA), 2018).

1.4. Local Resources

Hoanak union is a large union with lots of public and institutional resources. The union has 24 academic institutions, six hospitals and clinics, 11 markets, two cyclone shelters, 35 graveyards, five crematories and a large number of religious institutions. Among the religious institutions, there are 51 mosques, 10 Eidgah's and five temples. There are two salt mills that process a portion of the locally collected salt. There are six social and cultural organizations. A number of NGOs are also working in different sectors of the union.

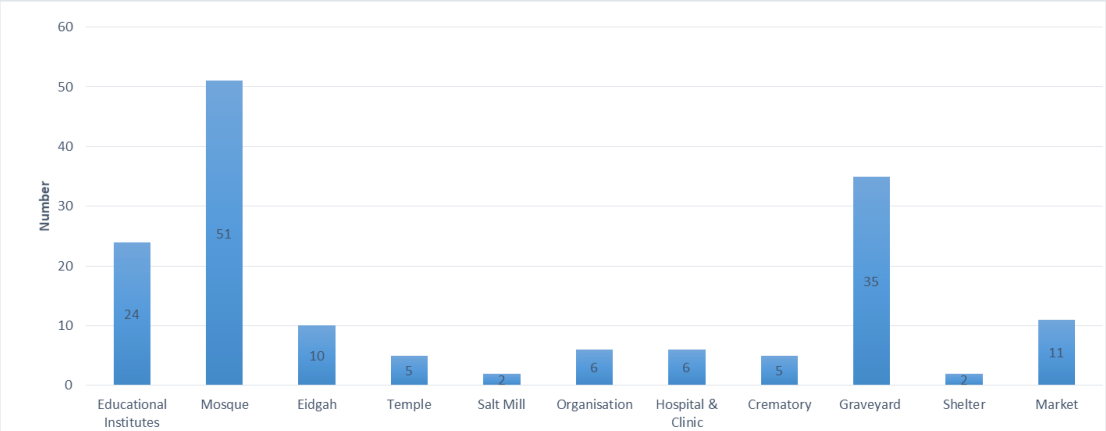

Figure 9 Local elements and resources (Field Survey, 2019)

Amongst the 24 educational institutions, there are 13 Govt. Primary schools, three High Schools, one college and four Madrasahs. There are also at least 10 Kowmi and Hifz madrasahs which were previously not recognized by the government which is why those are not accounted for here. There are also two abandoned Cyclone shelters that were constructed by CCDB in the aftermath of 1991 cyclone which are not under any active maintenance authority at this time (Chowdhury et al., 1993; Japan International Cooperation Agency(JICA), 2018; B. K. Paul et al., 2010).

Chapter 2. Local Hazards and Vulnerabilities

2.1. Historical Analysis of Hazards

The geophysical location along with the prevalence of unplanned settlements and developments increase the vulnerability of inhabitants and resources to natural hazards and climate change. The coastal area is highly exposed to cyclones, storm surges, tidal floods, erosion and salinity. The hilly coastal island is exposed to hydrogeological hazards such as landslides and flash floods. The Maheshkhali Upazila has experienced recurrent landslides and flashfloods in hilly areas as well as cyclones, storm surges, riverbank erosion waterlogging and tidal flood in the coastal area. This is one of the areas devastated by cyclone Gorky in 1991, which resulted in than more 140,000 fatalities and rendered 10 million homeless (Chowdhury, Bhuyia, Choudhury, & Sen, 1993; B. K. Paul, Rashid, Islam, & Hunt, 2010; S. K. Paul, 2011).

Hoanak Union of Maheshkhali Upazila in Cox's Bazar District is prone to flash floods, landslides, high tides, excessive rainfalls, cyclones and storm surges. Maheshkhali Upazila is widely known as an island Upazila because of it being an island located in the Bay of Bengal. The Maheshkhali Upazila islands exhibit a rather complex geological system located on the eastern cliff coast of Bangladesh, characterized by hilly topography surrounded by coastal plains which is subject to geologic, tectonic as well as geomorphologic peculiarities. The island is divided into four geological subareas; active coastal plains; young coastal plains; old coastal plains; and hilly areas with piedmont plains. Hoanak Union consists of a hilly region in the east and coastal plains in the west. The coastal regions of Bangladesh including the Maheshkhali Island located in a well-known cyclonic path that has been suffering severe cyclonic winds, storm surges and tidal waves over many years originating in the Bay of Bengal. However, the most recent cyclone and storm surge events occurred in 1992 and 1997 respectively in Hoanak union (Chowdhury et al., 1993; B. K. Paul et al., 2010). During those events, the number of casualties in the Hoanak union were not as high as in other unions of Maheshkhali because of its hilly topography and all the major settlements being located at the foot of the hilly region. However, being a hilly area, the Union has to face different types of hazards such as flash floods and landslides. There are a number

of streams flowing through the union from the east to the west that carries water from the hilly areas to the Bay of Bengal. During pre-monsoon, monsoon and post-monsoon seasons, heavy rainfall cause high-velocity discharges in these streams which ultimately results in flash flooding of the area. At the same time of year, landslides occur in the hills where many settlements are located. Therefore, flash floods and landslides are endemic and recurrent hazards in Hoanak Union. The Union is also significantly exposed to high tides throughout the pre-monsoon to post-monsoon season. As excessive rain damage crops and cause significant losses, it itself has been recognized as another hazard in this union.

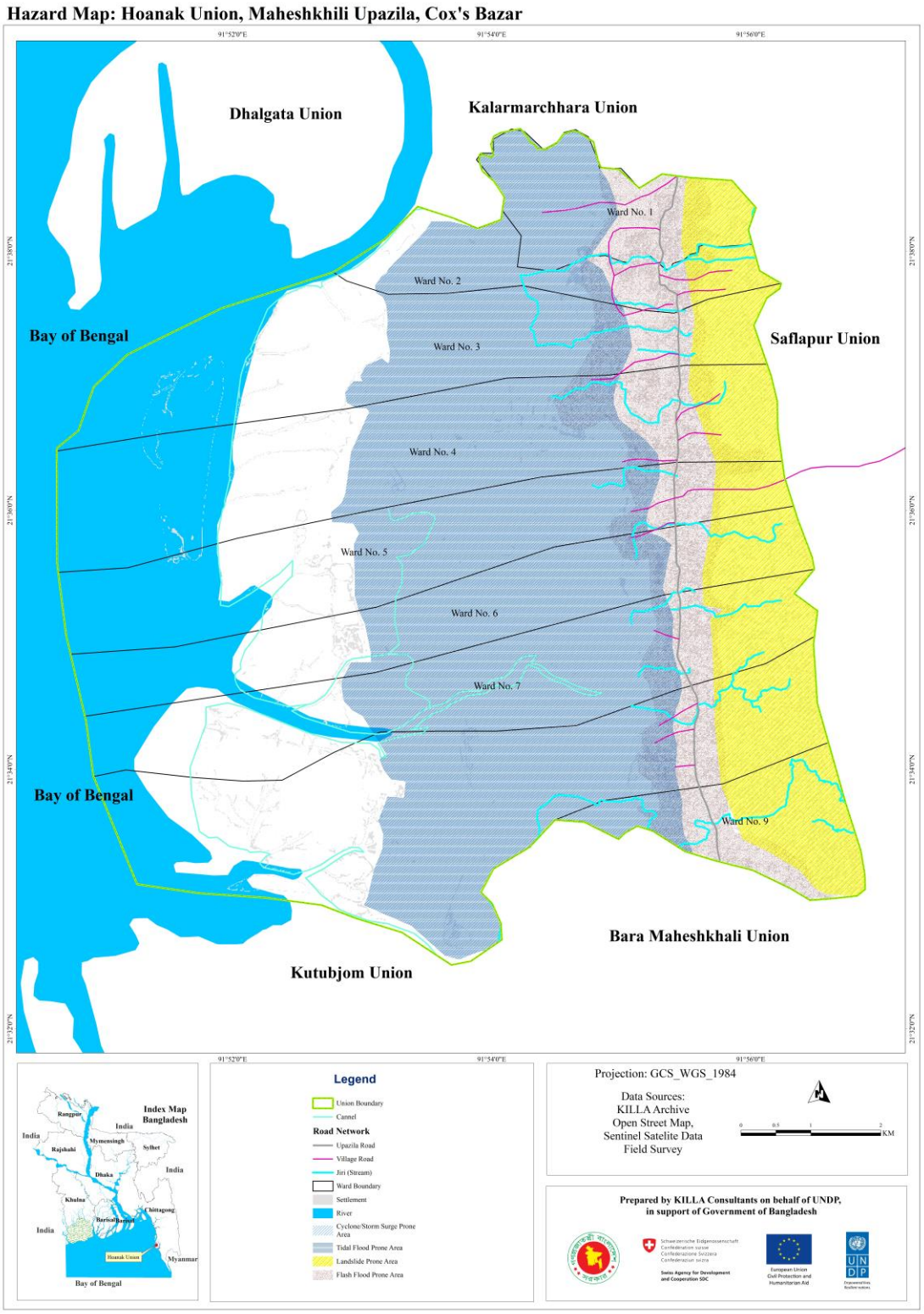

Figure 10: Hazard Map of Hoanak Union

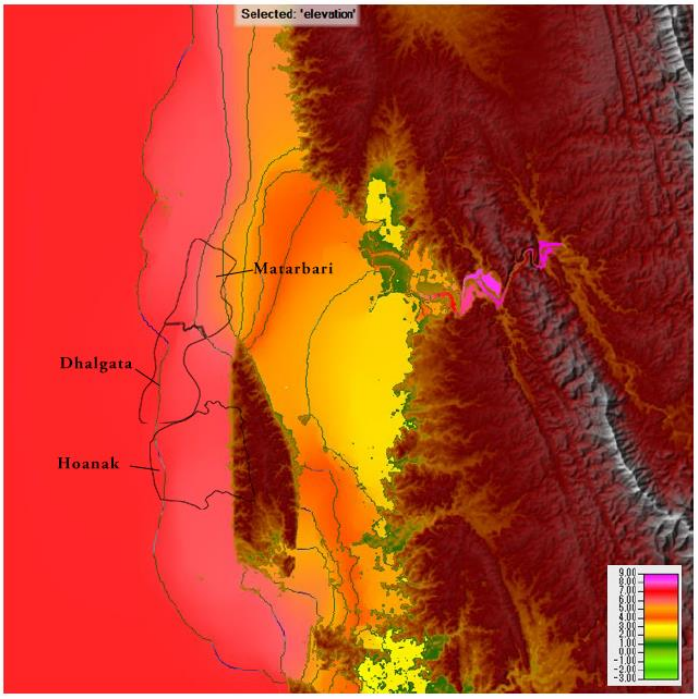

Figure 11: Maximum Water Surface Elevation Distribution (50-year Storm Surge + 20-year Flood)(Japan International Cooperation Agency(JICA), 2018)

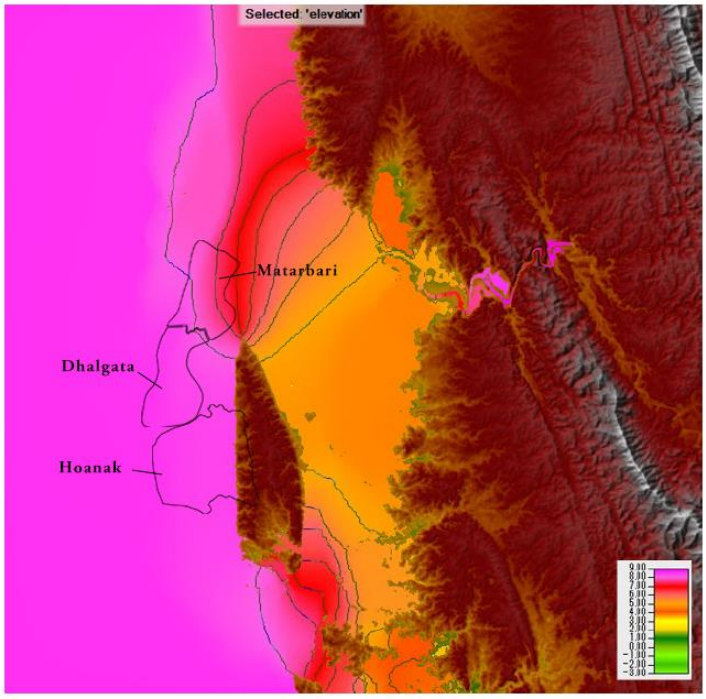

Figure 12: Maximum Water Surface Elevation Distribution (100-year Storm Surge + 20-year Flood))(Japan International Cooperation Agency(JICA), 2018)

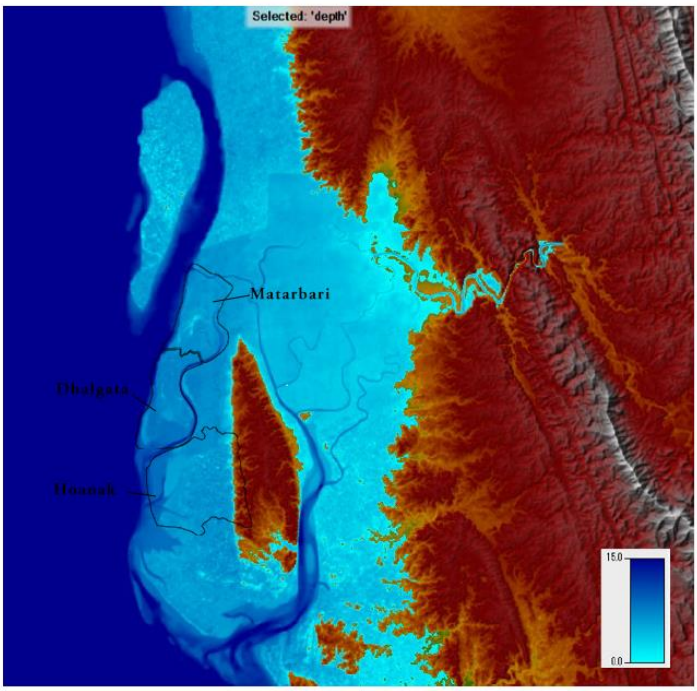

Figure 13: Distribution of Maximum Inundation Height (100-year Storm Surge + 20-year Flood)(Japan International Cooperation Agency(JICA), 2018)

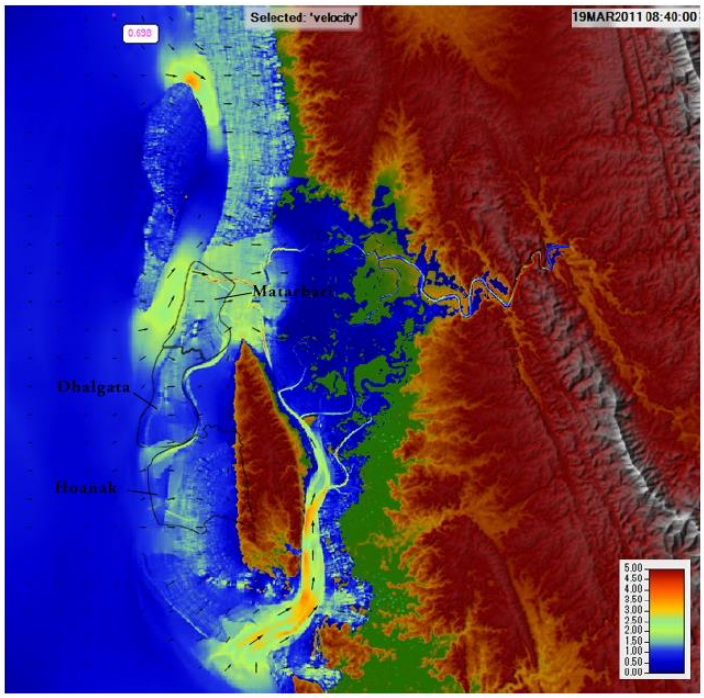

Figure 14:Flow Velocity / Velocity-Vector Distribution (100-year Storm Surge + 20-year Flood)(Japan International Cooperation Agency(JICA), 2018)

The Hoanak has complex geomorphological landforms. The prominence of low-lying coastal areas and vulnerable hilly areas make this union severely exposed to landslides,

flash floods and cyclone storm surges. The average elevation of the low-lying areas in the western areas of the union is no more than three meters, whilst the hilly areas are located at a much higher altitude. The salt fields and betel leaf fields are exposed to tidal floods and storm surges. Because of lower surface roughness in the salt field the water velocity does not decrease in the land. Figure 10 through Figure 13 displays the return frequency and characteristics of different flooding-related return parameters. Figure 10 shows the maximum water surface elevation distribution for 50-year storm surges and 20-year floods, according to the frequency modeled the water height rose about one to three meters in the low laying areas in the Hoanak Union for the 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 level increased by two to four meters (Figure 11). On the other hand, the inundation height for the 100-year return period storm surge and 20-year return period flood is about 1-4 meter in different places of the Hoanak union (Figure-12). In the hilly areas there were no significant effect on water levels from tidal surges, as the elevated areas work as a barrier for tidal and storm surges.

Flash floods mainly impact settlements near streams and extensively damage crops. Flash floods also damage unpaved roads and infrastructure situated in similarly vulnerable locations. Overall, they can cause widespread damage to livelihood and property. Male members of households in affected areas are unable to work during flash floods because they have to look after their family. Farmers lose their crops, shrimp stock, salt stores and cattle stock. Floods can also lead to a shortage of fodder to feed the remaining cattle. Floods can further impact the sources of income of the general population, as day laborers, both agricultural and non-agricultural, loose their jobs, businessmen cannot move their goods and people become dependent on loans as a replacement for salary incomes. Women and children are more vulnerable to flash floods and floods because they cannot swin. Households face problems related to cooking due to submerging of the kitchens. They also have to be extra careful with their children. Pregnant women and breast-feeding mothers face problems because the roads are damaged and they cannot access medical facilities. Children have to remain indoor in fear of drowning or being carried away by high-velocity water and are thus unable to receive education. Overall, the population experience food shortages and become dependent on high-interest loans.

Landslides causes damage to settlements located in the hills and leading to several casualties each year. It also destroys the betel leaf fields in the hilly areas, leading to significant economic losses. High tides causes damage mainly to the shrimp cultures. Excessive rainfall causes damage to salt and shrimp cultivation.

2.2. Hazard Venn and Calendar/ Seasonality

Historically Hoanak Union has faced a range of different natural disasters due to its geophysical characteristics and unique location. A complex geophysical setting with a history of sociopolitical issues makes this union even more vulnerable. Hoanak was one of the areas most devastated by cyclone Gorky in 1991 (Chowdhury et al., 1993; B. K. Paul et al., 2010). As an inner coastal area, it is highly exposed to a variety of intense natural disasters and extreme climate events. According to the people of the Hoanak union, the major hazards are landslides, flashfloods, cyclones and storm surges. Due to the hilliness of the region, the pervasiveness of steep slopes across it and low drainage capacity of the streams in the union, it experiences flashfloods several times per year. Because the soil texture is highly susceptible to landslides, the sandy loam soil and roads alike are easily eroded by water flows.

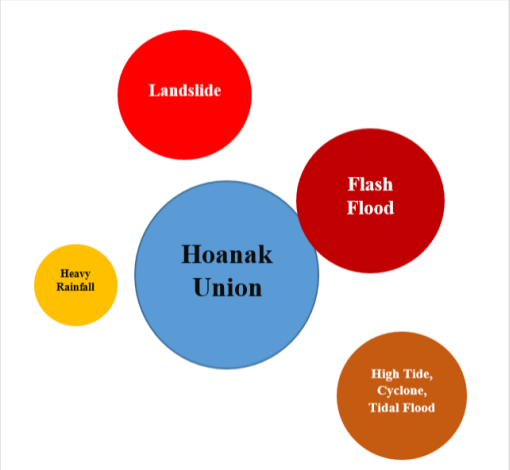

Figure 15: Hazard Venn (Field Survey, 2019)

Therefore, water logging is one of the major challenges, with high frequency and intensity. Amongst the many hazards, flash floods occur mainly between Baishak (Mid-April) and Vadra (Mid-August), whilst landslides occur mainly between Jaishtha (Mid May) and Vadra (Mid-August). Storm surges and tidal floods occur during the monsoon from Jaishtha (Mid May) to Srabon (Mid July). The hazard calendar of Hoanak Union is displayed below.

Table 1 Hazard Calendar of Hoanak 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	
Flash Flood																								
Landslide																								
Excessive Rainfall																								
High Tide																								

2.3. Crop Seasonality and Exposure to Hazards

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

The main crops of the Union are salt, betel leaves, shrimp and rice (BRRI-28, BR-10, BR-11 and Hybrid-9). Betel leaves are cultivated year round in the hilly parts of the union. Rice is also cultivated the year round. Salt is cultivated in the dry seasons and shrimp culture occurs in the same fields as salt collection in the dry seasons.

Betel leaves are generally exposed to flash floods, landslides and excessive rainfall. Salt cultivation is often hindered by excessive rainfall during pre-monsoon season. Shrimp cultures are exposed to high tides and excessive rainfalls. Rice cultivation is generally exposed to flash floods.

Table 2: Seasonal Crop Pattern (Field Survey, 2019)

Crop Season	Rabi Crop (October – March)	Kharip -1 (March – July)	Kharip -2 (July – October)
Crop Name	Betel Leaf	Betel Leaf	Betel Leaf
	Salt	Salt/Shrimp	Shrimp
	BRRI-28	-	BR-10
	Hybrid-9	-	BR-11

2.4. Land Use Pattern

Hoanak Union has a total of 9.115 acres of cultivable land. Agricultural land use is generally organized as triple and double croplands or used for other economic activities. About 10 percent of the land is used as triple cropland and about 85 percent of the land is used as double cropland. The remaining five percent of available land is used for other economic activities. Croplands are mainly threatened by flash floods as crops may become submerged and rot. Similarly, sedimentation during flash floods may reduce the depth of the soil in these fields.

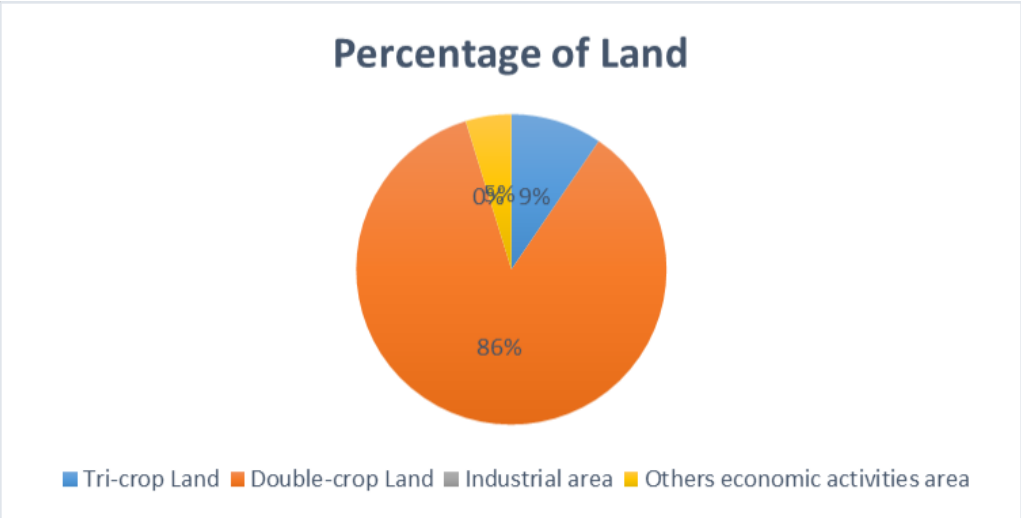

Figure 16: Landuse (%) (Field Survey, 2019)

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

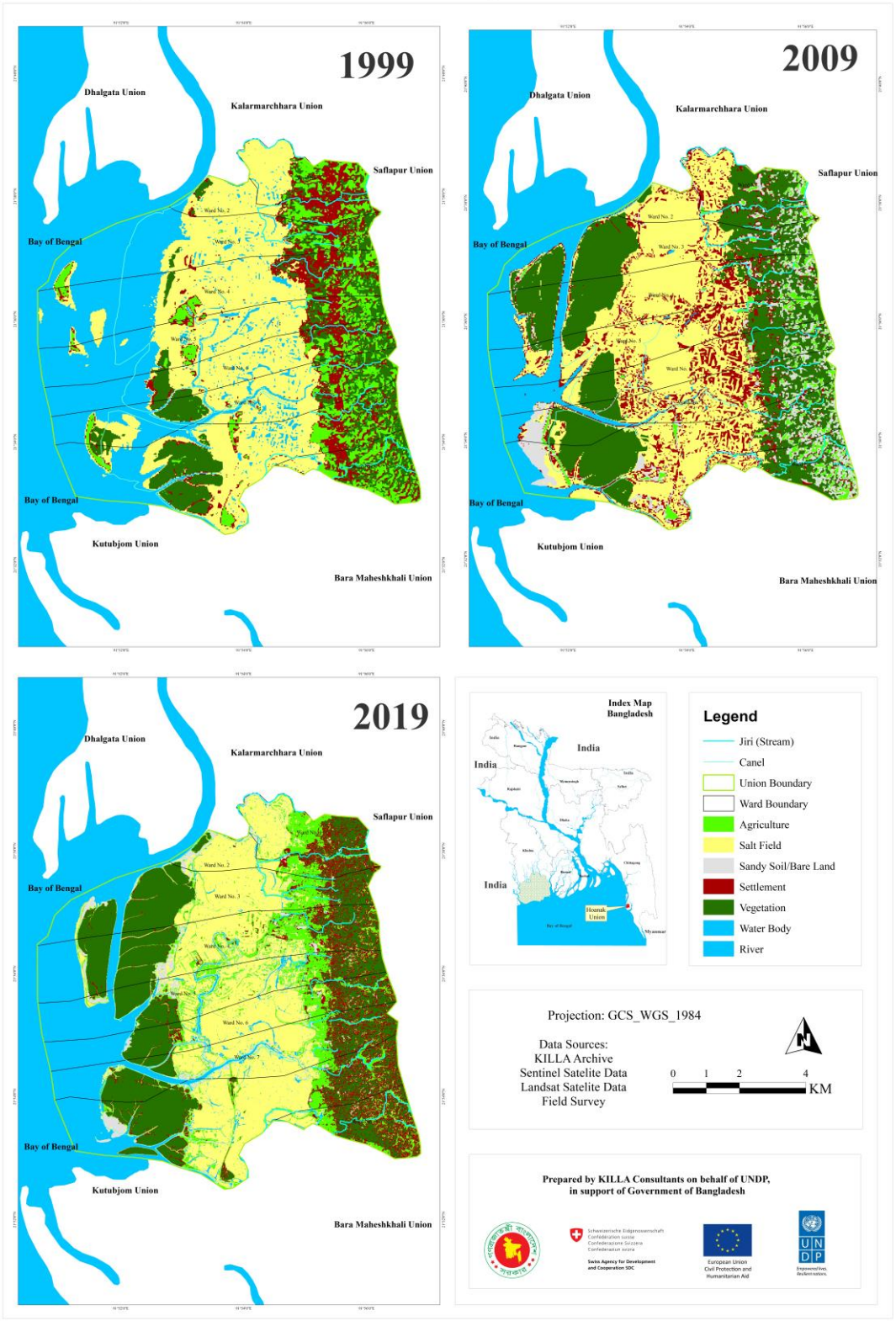

Figure 17: Landuse map, Hoanak Union

2.5. Livelihood Options and Vulnerability

In Hoanak Union, 90 percent of inhabitants are farmers (Field Survey, 2019). Agricultural activities take place year round as they switch between crops in the dry and wet seasons. The prevalence of flash floods constitutes the main vulnerability of agriculture in the Union as crops get washed away by flash floods, leading to food shortages and loss of employment opportunities. Similarly, flash floods threaten the wellbeing of livestock, as cattle are killed by water surges and the resulting shortage of animal food compounds the problem. Whilst flash floods are the most pressing threat to agriculture, crops are also affected by other natural hazards. The main vulnerability to farmers is their lack of transferable skills, which make them dependent on their own crops for their livelihood.

About 60 percent of the population of Hoanak Union is also engaged in fishing or shrimp culture. During flash floods, shrimp fields are at risk of being damaged from the high velocity of the water, sweeping away the basis of many inhabitants livelihood thus raising unemployment. Similarly, as 90 percent of the people are employed agricultural day labor which is why disaster periods result in high unemployment both due to a lack of job opportunities and lacking mobility. Further, many have to stay with their families for protection. The main vulnerability of the day laborers is lack of transferable skills suitable for different sectors as well as lacking willingness or ability to migrate for work opportunities (BBS, 2011; Field Survey, 2019).

About 5 percent of inhabitants are engaged in business, 0.1 percent are employed in salaried jobs and 0.01 percent in ad hoc employment. Individuals engaged in such non-agricultural economic activity also experience direct and indirect damage from natural disasters. Businesspeople risk losing their products in a flash flood and cannot transport their goods as necessary. Because of the same limited mobility, service workers face difficulties accessing their place of work. In all, 1 percent of people are beneficiaries of social programs and another 2 percent are unemployed due to lack of opportunity (Field Survey, 2019).

The wage for a seasonal day laborer is between 900 to 1000 taka for men and 250 to 350 taka for women. For non-seasonal day laborers, the wage for a man is around 600 to 700 taka and 250 to 350 for a woman (Field Survey, 2019).

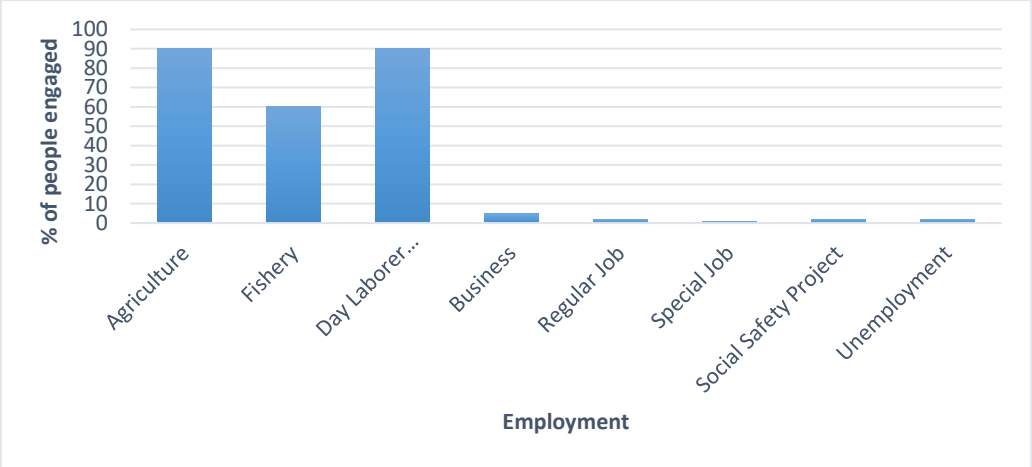

Figure 18 Percentage of people engaged in different occupation (Field Survey, 2019)

2.6. Vulnerability of the Population and Local Economy to Climate Hazards

Food production in the union includes rice, salt, shrimp, vegetables, livestock, poultry and fisheries. Among them, rice and vegetable production meets approximately 50% of the union''. needs For the remaining crop production such as salt, shrimp and fishing, production is 100 percent self-sufficient and more than 90 percent of production is exported and no production deficiency occurs. Livestock and poultry production face a very high level of production deficiency (Field Survey, 2019).

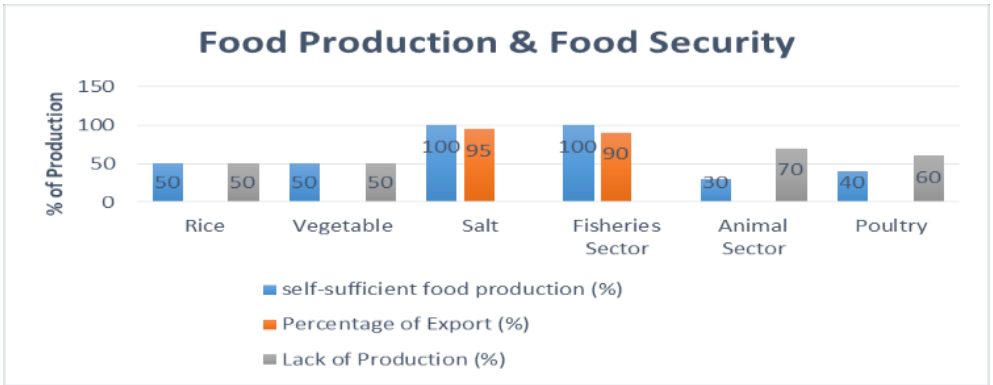

Figure 19 Food Production and Food Security (Field Survey, 2019)

Crop production is severely affected by flash floods, landslides and tidal floods. As vegetables are cultivated in the winter season, its production faces limited threats from natural disasters. Fishes however are at risk of being washed away by flash floods and fishermen cannot catch fish during flooding events. In addition, fresh water flooding reduces water salinity which negatively impacts shrimp cultivation. Flash floods also affect the livestock and poultry sectors because of animal food shortages as well as the spreading of diseases.

Chapter 3. Community Risks and Vulnerability

3.1. Risks and Consequences across Sectors

In Maheshkhali Upazila, Hoanak is a large Union with a lot of assets which are largely exposed to flash floods, high tides, excessive rainfalls and landslides in pre-monsoon, monsoon as well as post-monsoon seasons. These assets can be sorted into broader classes i.e. physical assets, crops, livestock and fisheries, land, transport as well as natural elements like streams, ponds and canals. Physical assets include a diverse range of buildings such as schools, madrasahs, mosques, temples, mills and industries, community clinics, latrines and households. Infrastructure assets are mainly paved and unpaved roads, bridges and culverts.

Among these infrastructure assets, roads are highly exposed to flooding and storm surge, but the consequences of roads are low to moderate. Other physical assets are moderately exposed to flash floods. Consequences of fooding for these elements are low for pucca structures and moderate to high for katcha structures.

Crops comprise betel leaves, different types of paddy (BRRI-28, BR-10, BR-11, and Hybrid-9), salt and shrimps. Crops are highly vulnerable to flash floods during pre-monsoon to post-monsoon period and the negative consequences are high. Agricultural lands in the plain lands face moderate to high exposure to flash floods. All the betel leaf fields in the hills are highly exposed to landslides and the negative consequences are

also high. Shrimp cultures are highly exposed to high tides and excessive rainfalls. In general, the assets facing the highest risks from natural disasters are as follows:

Highest at-risk elements: unpaved roads, katcha households, betel leaf fields, paddy plantations, shrimp cultures, culverts, streams and canals.

Moderately at-risk elements: Paved roads, Schools, masjids, madrasahs, bazars, temples, cemeteries and community clinics.

As stated above, the crop production is highly exposed to flash floods. In case of sustained rains over two to three days and the occurrence of flash floods in pre-monsoon to post-monsoon seasons, betel leaf fields, shrimp cultures and rice fields (BR-10 and BR-11) across the Union would be severely affected and salt production would be moderately affected. As consequence, farmers would lose everything and may lose interest in farming. Other consequences of such a disaster can be food deficiencies, price hikes, poverty, raising loan dependency (with the high rate of interest), scarcity of animal fodder as well as a lack of access to education and health services.

In the transport sector, unpaved roads and culverts across the Union would face moderate damage from flash floods. Some bricked and paved roads would also be moderately affected. Canals would be moderately affected as the high sediment loads of the floodwater would reduce the depth of the canals. This would result in disruption of communications and disrupt mobility affecting business, farming, education of school-going children and access to health facilities.

Physical assets (households, educational institutions, mosques, temples, cemeteries and markets) in all wards would be affected by a flash flood as stated above. Some households that are located in the hills are likely to be damaged by landslides. Students will not be able to continue their education if their educational institution is damaged.

All streams across the Union would be moderately affected by flash floods as sediment carried by the floodwater may reduce the depth of the streams and thus reduce their ability to carry water. This could result in further flash floods if they experience an additional two to three days of antecedent rainfall. Crop fields would be moderately affected as sedimentation from the flash flood can reduce the fertility of the soil. Vangar

khal, Jamiri Khal and Vorapari khal are areas likely to be affected. Settlements in some villages are likely to be moderately affected as a whole.

3.2. Risk Statement with High Priority

Elements	Risk Statement	Consequence	Rank
Road	If it rains heavily for two to three days, the road named 'Dhalghatapara bazar Purba Shorok' of ward 8 will be affected severely.	Hindrance of the transportation of goods, general movement of residents and school-going children	1
Canal	If it rains heavily for two to three days, the canal 'Vangar Khal' of ward 9 will be affected by the deposition of sand carried by flash flood and reduction in depth	Navigability loss will cause economic loss in the transportation of goods	2
Stream	If it rains heavily for two to three days, the Stream near Keruntoli Bazar of ward 7 will be filled up with sediment and overflow	More than 100 houses will be washed away by flash floods	3
Stream	If it rains heavily for two to three days, the stream 'Barochhora' will overflow and nearby settlements of the village of ward 3 will be moderately affected	Settlements will be damaged and communications will be disrupted	4
Canal	If it rains heavily for two to three days, the canals will overflow and submerge the surrounding rice fields of Ichhakhali and Mohishkhali Ghona of the ward will be moderately affected.	Rice will be washed away, soil fertility will be reduced	5
Road	If it rains heavily for two to three days, the road near the East side of Noyapara Khalilur Rahman's pond of ward 7 will be moderately affected.	Hindrance of the transportation of goods, general movement of residents and school-going children	6
Road	If it rains heavily for two to three days, the road of Keruntoli Noyapara of ward 7 will be moderately affected.	Hindrance of the transportation of goods, general movement of residents and school-going children	7
Bazar	If it rains heavily for two to three days, Rajghorghona Bazar of ward 6 will be flooded	Damage to shops and disruption to business	8
Road	If it rains heavily for two to three days, the road from Hazi Badshah Mia's home to Islam Mia's Home of ward 1 will be moderately affected.	Hindrance of the transportation of goods, general movement of residents and school going children	9
Road	If it rains heavily for two to three days, the main road on the south side of Chhonkhola Para of ward 3 will be submerged by 4 feet	Disruption to communications	10
Agriculture	If it rains heavily for two to three days, the 50-acre rice field on the west side of ward 6 will be washed away by overflowing of South Kainnachhora	Reduction in soil fertility leading to economic losses	11
Road	If it rains heavily for two to three days, the road from Tarek's home to Raja Mia's Home of ward 1 will be moderately affected.	Hindrance of the transportation of goods, general movement of residents and school-going children	12
Road	If it rains heavily for two to three days, the road from Deillaghona Tofel Ahmad's home to Rashid Mia's Home of ward 1 will be severely affected.	Hindrance of the transportation of goods, general movement of residents and school-going children	13
Health Complex	If it rains heavily for two to three days, the Union Health Complex near Kalagazir Para bazar of ward 2 will be submerged by 2.5-4 feet of water	The health complex will be shut down, vital equipment and medicines will be damaged or destroyed	14
Agriculture	If it rains heavily for two to three days, 50 Betel leaf fields of Rajghorghona Kainnachhora of ward 6 will be destroyed by landslides	Economic loss to farmers	15

Settlements	If it rains heavily for two to three days, 20 settlements of Edillapara on the east side of Barochhora of ward 5 will be destroyed by landslides	Total destruction of settlements and high casualty rates	16
Settlements	If it rains heavily for two to three days, about 120 settlements of Rajghor Ghona DakkhinPara of ward 6 will be affected by the erosion of Kainnachhora Stream and be flooded	Settlements will be flooded and washed away or partially destroyed	17
Settlements	If it rains heavily for two to three days, the 250 settlements of Majherkhola, Dhanikhola, Dolakhali and Lobonkhola of ward 1 will be moderately affected	Settlements will become uninhabitable, economic loss caused by needs for repairs	18
Battle Leaf Garden	If it rains heavily for two to three days, 50 Betel leaf fields of Rajghorghona Kainnachhora of ward 6 will be destroyed by landslides	Economic losses to farmers and general loss of livelihood	19
Prawn project	If it rains heavily for two to three days, the Prawn Projects of Adirghona of ward 6 will be affected by the damage to project embankment	Economic losses to farmers and general loss of livelihoods	20

3.4. Sensitivity and Exposure Analysis

Elements	**Risk Statement**	**Exposure to hazards**	**Key Components**	**Sensitivity-1**	**Sensitivity-1**	**Sensitivity-1**
Road	If it rains heavily for two to three days, the road named 'Dhalghatapara bazar Purba Shorok' of ward 8 will be severely affected.	Flash Flood Landslide	Brick (Guide wall)	Quality	Base materials	Stability
			Soil	Cohesion	Soil type	Soil texture
Canal	If it rains heavily for two to three days, the canal 'Vangar Khal' of ward 9 will be affected by the deposition of sand carried by flash floods and canal depth will be reduced	Flash Flood	Sediment	Concentration		
			Water	Velocity	Convince Capacity	
Stream	If it rains heavily for two to three days, the stream near Keruntoli Bazar of ward 7 will be filled up with sediment and overflow	Flash Flood	Sediment	Concentration		
			Water	Velocity	Convince Capacity	
Stream	If it rains heavily for two to three days, the stream 'Barochhora' will overflow and flood settlements of the village in ward 3 which will be moderately affected.	Flash Flood	Sediment	Concentration		
			Water	Velocity	Convince Capacity	
Canal	If it rains heavily for two to three days, the canals will overflow and submerge the rice fields of Ichhakhali and MohishkhaliGhona in ward will be moderately affected.	Flash Flood	Sediment	Concentration		
			Water	Velocity	Convince Capacity	

Road	If it rains heavily for two to three days, the road near the east side of Noyapara Khalilur Rahman's pond in ward 7 will be moderately affected.	Flash Flood Landslide	Brick (Guide wall)	Quality	Base materials	Stability
			Soil	Cohesion	Soil type	Soil texture
Road	If it rains heavily for two to three days, the road in Keruntoli Noyapara of ward 7 will be moderately affected.	Flash Flood Landslide	Brick (Guide wall)	Quality	Base materials	Stability
			Soil	Cohesion	Soil type	Soil texture
Bazar	If it rains heavily for two to three days, Rajghor Ghona Bazar of ward 6 will be flooded	Flash Flood Landslide	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	
Road	If it rains heavily for two to three days, the road from Hazi Badshah Mia's home to Islam Mia's Home in ward 1 will be moderately affected.	Flash Flood Landslide	Brick (Guide wall)	Quality	Base materials	Stability
			Soil	Cohesion	Soil type	Soil texture
Road	If it rains heavily for two to three days, the main road on the south side of Chhonkhola Para in ward 3 will be submerged by 4 feet of water	Flash Flood Landslide	Brick (Guide wall)	Quality	Base materials	Stability
			Soil	Cohesion	Soil type	Soil texture
Agriculture	If it rains heavily for two to three days, the 50-acre rice field on the west side in ward 6 will be washed away by overflowing waters in South Kainnachhora	Flash flood Cyclone Tidal flood	Land	Sensitive to change in weather	Elevation	
			Seeds	Sensitive to change in weather	Germination	Seed bed elevation
Road	If it rains heavily for two to three days, the road from Tarek's home to Raja Mia's Home in ward 1 will be moderately affected.	Flash Flood Landslide	Brick (Guide wall)	Quality	Base materials	Stability
			Soil	Cohesion	Soil type	Soil texture
Road	If it rains heavily for two to three days, the road from Deillaghona Tofel Ahmad's home to Rashid Mia's Home in ward 1 will be severely affected.	Flash Flood Landslide	Brick (Guide wall)	Quality	Base materials	Stability
			Soil	Cohesion	Soil type	Soil texture

Health Complex	If it rains heavily for two to three days, the Union Health Complex near KalagazirPara bazar in ward 2 will be submerged by 2.5 to 4 feet of water	Flash Flood Landslide	Brick	Quality	Base materials	Stability
			RCC	Materials	Construction Quality	
			Soil	Cohesion	Soil type	Soil texture
Agriculture	If it rains heavily for two to three days, the 50 Betel leaf fields of Rajghorghona Kainnachhora in ward 6 will be destroyed by landslides	Flash Flood Cyclone Tidal Flood	Land	Sensitive to change in weather	Elevation	
			Seeds	Sensitive to change in weather	Germination	Seed bed elevation
Settlements	If it rains heavily for two to three days, the 20 settlements of Edillapara on the east side of Barochhora in ward 5 will be destroyed by landslides	Flash Flood Landslide	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	
Settlements	If it rains heavily for two to three days, the about 120 settlements of Rajghor Ghona DakkhinPara in ward 6 will be affected by the erosion of the Kainnachhora Stream and experience flooding	Flash Flood Landslide	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	
Settlements	If it rains heavily for two to three days, the 250 settlements of Majherkhola, Dhanikhola, Dolakhali and Lobonkhola of ward 1 will be affected Moderately	Flash Flood Landslide	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	

Betel Leaf Fields	If it rains heavily for two to three days, the 50 Betel leaf fields of Rajghorghona Kainnachhora in ward 6 will be destroyed by landslides	Flash Flood Cyclone	Land	Sensitive to change in weather	Elevation	
			Battle Leaf	Highly sensitive to water		
			Bamboo and Jute creek	Highly sensitive to water		
Prawn cultures	If it rains heavily for two to three days, the Prawn Projects of Adirghona in ward 6 will be affected by the damage of project embankment	Flash Flood Cyclone Tidal Flood	Land	Sensitive to change in weather	Elevation	
			Prawn	Sensitive to change in weather		

3.5. Adaptive Capacity

The Hoanak Union is located in a complex geophysical area where the presence of all types of hazards like landslides, flash floods, cyclones, storm surges and tidal floods. Because of this, salinized soil and eroding land s. Combined with the natural vulnerability of anthropogenic factors may exaggerate damage and loss in case of a disaster. In the Risk Reduction Action Plan and risk reduction option for this union the main structural interventions are the dredging the canals and construction of guide walls. The relocation of houses is one of the possible interventions to reduce causalities and damage sustained from landslides. As cyclones and tidal floods have occurred in the lower coastal areas, fisheries and betel leaf fields in the area have been affected. Increasing the height of the plinths and guide walls would provide a solution capable of protecting the settlements from flash floods. Local inhabitants, key informants, government organizations and other stakeholders in the union have urged perpetrators to stop cutting down trees and to plant more trees in order to limit the hazards posed by landslides. To address the need for risk reduction interventions, a long term comprehensive development plan should be established.

Chapter 4. Risk Reduction Options and Action Plan

4.1. Risk Reduction Options

There are several risk reduction options to consider, including a reduction of exposure to and sensitivity to hazardous events. To reduce the exposure of crops, guide walls and embankments by the bank of the streams should be constructed so that water does not enter the crop fields. Moreover, to avoid flash floods or rainwater causing damage to the crops, drainage within and around the crop fields should be constructed. To reduce the sensitivity of the crops themselves, the betel leaf fields should be elevated well above water level and farmers need to be well trained in the practices of plantation, irrigation and harvesting. The embankments of the shrimp fields should be strong and high enough to withstand the force of floodwater. To reduce the exposure of settlements to landslides, the settlements should be relocated to safer locations. Tree plantation and limiting the practice of hill cutting can reduce the magnitude and intensity of both landslides and flash floods.

To reduce the exposure of roads (both paved and unpaved), bridges and culverts, road height must be increased so that it will not be inundated during a severe flood situation. Hammering of the roads may also reduce their sensitivity to damage from flooding. Streams and canals must be dredged regularly so that these can sustain the extra water load during rain periods. To reduce the sensitivity of transportation elements, erecting guide walls in vulnerable places must be prioritized. Locals should be engaged in all of these processes and participate in the decision-making regarding construction, monitoring and maintenance of embankments and guide walls. Drains must be constructed along the roads to facilitate water run-off.

As all the settlements in the Union are surrounded by streams, physical structures and buildings, i.e. educational institutions, offices, religious sites and health complexes should be constructed in high areas and must be pucca as to reduce their exposure to various hazards. To further reduce the risk to these structures, good building materials must be used for their construction, floors must be covered with concrete and trees should be planted in open places around the structures. Important places such as markets, cemeteries and crematories should be surrounded by guide walls or revetment

if necessary. Again, dredging of the streams and plantation of trees in the surrounding hills will serve to further reduce the intensity of hazardous events.

Moreover, installing a community-based early warning system can reduce risks. Risk transfer mechanisms for life, assets and livelihood should be introduced, such as agricultural insurance schemes.

Hoanak union is unique in terms of the hazards as well as its geographical location and geological properties compared to the adjacent union of Maheshkhali Upazila in Cox's Bazar district. The prevalence of different types of hazards like flash floods and landslides demands a completely different approach in managing hazards and disasters. Long term planning and further studies can make development projects more fruitful in the future.

Overall, the main risk reduction options are as follows:

Livelihood elements:

1. Guide walls and embankment construction along the streams.
2. Develop drainage systems in crop fields.

Physical elements:

1. Raising the height of roads, embankments and plinths for buildings and settlements.
2. Proper planning and construction of drains and culverts.
3. Proper and timely maintenance of roads.
4. Construct guide walls in vulnerable locations.
5. Hammering unpaved roads.
6. Dredging of streams and canals.
7. Introducing erosion control measures, for example revetment works and dumping geobags where necessary.
8. Construction of flood resilient buildings.

Life and asset elements:

1. Introduce an improved community based early warning system and proper response mechanisms.
2. Risk transfer mechanisms for life, assets and livelihoods

4.2. Risk Reduction Action Plan

No	Activities	Who	When	How	Where	Approximate Cost	Other Consideration
1	Construction of the Guide walls (Road Side)	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2020	Participation of local population Ensure Slope and Toe Protection	Barochhora on the west side of Panirchhara Bazar and "Moddhyom Rasta" in ward 9		The labor force must consist of local labor
2	Construction of the Guide walls (Boundary of the Playground)	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2020	Participation of local population Ensure Slope and Toe Protection	Playground of Panirchhara Govt. Primary School of ward 9		The labor force must consist of local labor
3	Construction of the Guide walls (Boundary of the Playground)	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2020	Participation of local population Ensure Slope and Toe Protection	The road near Joier Kata Thanda Mia's home of ward 99		The labor force must consist of local labor
4	Drainage system in the crop fields	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2020	Participation of local population Ensure Slope and Toe Protection	From south side of Rajghat to North side of North Rajghat		The labor force must consist of local labor
5	Raising the height of roads,	UP, LGED, UNDP, Govt./Non-	2019-2020	Participation of local population Ensure Slope and Toe Protection	The road near Joier Kata Thanda Mia's home of ward 9		The labor force must consist of local labor

		Govt Organization					
6	Raising the height of roads,	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2020	Participation of local population Ensure Slope and Toe Protection	the road of Kalaliakata PoshchimPara of ward 8		The labor force must consist of local labor
7	Raising the height of roads,	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2020	Participation of local population Ensure Slope and Toe Protection	'Dhalghatapara bazar Purba Shorok' of ward 8		The labor force must consist of local labor
8	Raising the height of roads,	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2020	Participation of local population Ensure Slope and Toe Protection	'Kalaliakata Hazi Chan Mia Shorok' of ward 8		The labor force must consist of local labor
9	Raising the height of roads,	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2020	Participation of local population Ensure Slope and Toe Protection	Road of Keruntoli Noyapara of ward 7		The labor force must consist of local labor

10	Raising the height of roads and construction of the guide wall	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2020	Participation of local population Ensure Slope and Toe Protection Ensure Slope and Toe Protection	the roads of BaroghorPara on the west side of Panirchhara Bazar and "Moddhyom Rasta" of ward 9 will		The labor force must consist of local labor
11	Raising the height of roads and construction of the guide wall	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2020	Participation of local population Ensure Slope and Toe Protection	Keruntoli Noyapara Jagir Hosen's Home of ward 7		The labor force must consist of local labor
12	Raising the height of roads and construction of the guide wall	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2020	Participation of local population Ensure Slope and Toe Protection	Noyapara Khalilur Rahman's pond of ward 7		The labor force must consist of local labor
13	Raising the height of roads,	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2020	Participation of local population Use high cohesion and compact clay soil	Road near Keruntoli Nur Ahmad's Home of ward 7		The labor force must consist of local labor
14	Raising the height of roads,	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2020	Participation of local population Use high cohesion and compact clay soil	Road near Keruntoli Nur Ahmad's Home of ward 7		The labor force must consist of local labor
15	Raising the height of roads and construction of the guide wall	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2020	Participation of local population Use high cohesion and compact clay soil	The road of the east side of Chhonkhola Para Bazar of ward 1		The labor force must consist of local labor

16	Raising the height of roads and construction of the guide wall	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2020	Participation of local population Ensure Slope and Toe Protection	The road from Hazi Badsha Mia's home to Islam Mia's Home of ward 1		The labor force must consist of local labor
17	Raising the height of roads and construction of the guide wall	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2020	Participation of local population Ensure Slope and Toe Protection	Road from Tarek's home to Raja Mia's Home of ward 1		The labor force must consist of local labor
18	Raising the height of roads,	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2020	Participation of local population Ensure Slope and Toe Protection	The road from Deillaghona Tofel Ahmad's home to Rashid Mia's Home of ward 1		The labor force must consist of local labor
19	Repair the road	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2020	Participation of local population Ensure Slope and Toe Protection	The main road on the south side of Chhonkhola Para of ward 3		The labor force must consist of local labor
20	Increase the height of plinth of buildings and settlements.	UP, LGED, UNDP, Households Owner	2019-2022	Ensure that there aren't any landslide or flash flood risk	Union Health Complex near KalagazirPara bazar of ward 2		Provide information and training to the local population
21	Increase the height of plinth of buildings and settlements.	UP, LGED, UNDP, Households Owner	2019-2022	Ensure that there aren't any landslide or flash flood risk	120 settlements of Rajghor Ghona DakkhinPara of ward 6		Provide information and training to the local population
22	Increase the height of plinth of buildings and settlements	UP, LGED, UNDP, Households Owner	2019-2022	Ensure that there aren't any landslide or flash flood risk	20 settlements of Edillapara on the east side of Barochhora of ward 5		Provide information and training to the local population

23	Increase the height of plinth of buildings and settlements	UP, LGED, UNDP, Households Owner	2019-2022	Ensure that there aren't any landslide or flash flood risk	The Solaiman Bohotdar's Home and adjacent households of ward 4		Provide information and training to the local population
24	Increase the height of plinth of buildings and settlements	UP, LGED, UNDP, Households Owner	2019-2022	Ensure that there aren't any landslide or flash flood risk	More than 50 settlements near 'Purba Majhir Chhora'		Provide information and training to the local population
25	Increase the height of plinth of buildings and settlements	UP, LGED, UNDP, Households Owner	2019-2022	Ensure that there aren't any landslide or flash flood risk	Rajghor Ghona Bazar of ward 6		Provide information and training to the local population
26	Increase the height of plinth of buildings and settlements	UP, LGED, UNDP, Households Owner	2019-2022	Ensure that there aren't any landslide or flash flood risk	Chhonkholapara Bazar of ward 1		Provide information and training to the local population
27	Increase the height of plinth of buildings and settlements	UP, LGED, UNDP, People	2019-2022	Ensure that there aren't any landslide or flash flood risk	The 250 settlements of Majherkhola, Dhanikhola, Dolakhali and Lobonkhola of ward 1		Provide information and training to the local population
28	Increase the height of the embankment	UP, LGED, BWDB UNDP, Govt./Non-Govt Organization	2019-2021	Participation of local population Ensure Slope and Toe Protection	Prawn Projects of Adirghona of ward 6		Ensure proper quality of construction materials
29	Proper and timely maintenance of the roads	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2020	Capacity of the flood flow.	All roads of the union except the Upazila road.		

30	Hammering of unpaved roads	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2020	Participation of local population Ensure Slope and Toe Protection	Noyapara and Sairardail Ward no 6, 7, and9, These settlements are located outside of the embankment of the shoreline.		
31	Dredging of streams and canals	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2021	Participation of local population Ensure adequate drainage capacity in heavy rainfall periods	'Vangar Khal' of ward 9		
32	Dredging of streams and canals	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2021	Participation of local population Ensure adequate drainage capacity in heavy rainfall periods	Canal of Ichhakhali and MohishkhaliGhona of ward 3		
33	Dredging of streams and canals	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2021	Participation of local population Ensure adequate drainage capacity in heavy rainfall periods	the stream 'Barochhora' of the village of ward 3		
34	Dredging of streams and canals	UP, LGED, UNDP, Govt./Non-Govt Organization	2019-2021	Participation of local population Ensure adequate drainage capacity in heavy rainfall periods	the Stream near Keruntoli Bazar of ward 7		

*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

The Hoanak Union is located in a complex geophysical area where a multitude of hazards occur such as landslides, flash floods, cyclones, storm surges and tidal floods. This geophysical complexity also makes the soil quality and land formation vulnerable factors. Alongside this natural vulnerability, anthropogenic factors further exaggerate the damage and loss in case of a natural disaster. In line with the Risk Reduction Action Plan and risk reduction options for this union, the main structural interventions available are the dredging the canals and construction guide walls. The relocation of houses is another intervention with potential to reduce damage and causalities from landsides. Cyclones and tidal floods have occurred in the lower coastal area where the fisheries and the betel leaf fields are located, making them vulnerable. Increasing the height of the plinths and guide walls are potential solutions to protect the settlements from flash floods. The local population, key informants, government organizations and other stakeholders in this union should be urged to stop cutting down trees in the hills and to plant more trees to mitigate the hazards posed by land slides. To address the need for overall risk reduction, a long term comprehensive development plan should be developed.

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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	Date
1	Mohammad Mostofa Kamal	Chairman	01814111327	22-09-19
2	AB Chowdhury	Businessman, Time Bazar, Hoanak	01866030856	22-09-19
3	Md. Shah-Alam	Businessman, BDRCS volunteer, ward no-4, Hoanak.	01825253830	23-09-19
4	Abul Hashem	Member, Ward-07, Hoanak UP	01824516984	23-09-19
5	Kamrunnahar	Member (reserved 4,5,6 No Ward)	01882901830	22-09-19
6	Minara Rahman Mina	Member (reserved 1,2,3 No Ward)	01882902807	22-09-19
7	Md. Jalal	Teacher, Hoanak High School		23-09-19

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 List

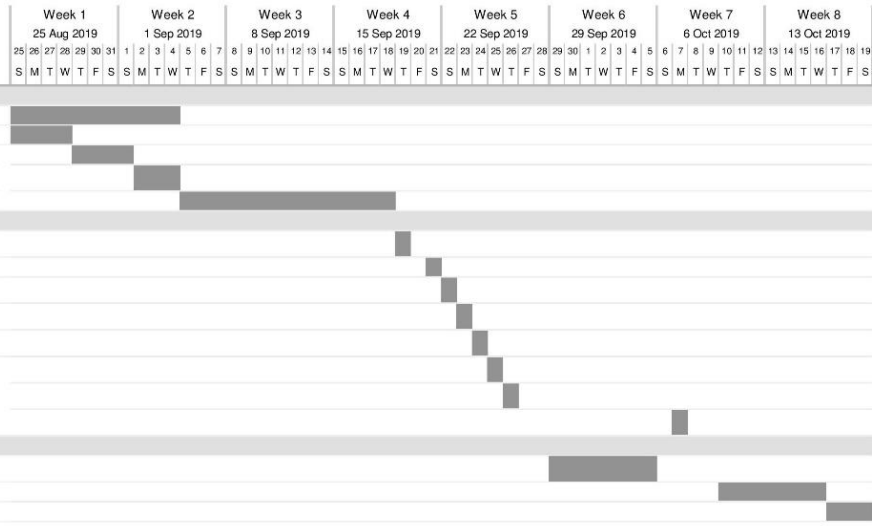
Sl. No	Location	Community	Date
1	Hoanak Bazar	Businessmen	22-09-19
2	1 no block Ward no -1	Farmers, Day labour	22-09-19
3	Purbo (East) Majerpara, Ward no-5	Farmer and Fishery	23-09-19
4	Jamal Para, Ward no-4	Women	23-09-19
5	Chonkhola Para, Ward no-2	Women, Household owner	22-09-19
6	Baniyakata, Ward no - 4	Day labour	22-09-19
7	Kazlapara Bazar, Ward no - 2	Women	23-09-19
8	Time Bazar	Small Business person	23-09-19

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



Participation list of Upazila CRA Validation Workshop

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

নাম	পদবি	মোবাইল নম্বর	স্বাক্ষর
মো: শাহিদ হবিব	উপ: সহকারী প্রকৌ: উপজেলা প্রকৌশলীর কার্যালয়	01713-269393	[illegible]
নীরেন্দ্র চন্দ্র পাল	উপ: যুব উন্নয়ন কর্মকর্তা	01718530068.	[illegible]
তপন কুমার বড়ুয়া.	উপজেলা খাদ্য নিয়ন্ত্রক.	01819019442	[illegible]
মো: জসিম উদ্দিন চৌ:	আনসার-ভিডিপি অফি:	01830199060	[illegible]
মো: আবদুল মান্নান	উপজেলার মাধ্যমিক শিক্ষা অফিসার	01712267235	[illegible]
মো: মাহমুদুল হাসান খোন্দকার	উপজেলা কৃষি সম্প্রসারণ অফিসার মহেশখালী, কক্সবাজার	01701235908	[illegible]
মো: গোলাম মাসুদ চৌধুরী	উপজেলা সমাজসেবা অফিসার মহেশখালী, কক্সবাজার	01819-639375	[illegible]
মো: সাইফুল ইসলাম খন্দকার	উপজেলা শিক্ষা অফিসার	01716-424641	[illegible]
মিনু [illegible] বেগম	মহিলা ভাইস চেয়ারম্যান	01818025417	[illegible]

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

নাম	পদবি	মোবাইল নম্বর	সাক্ষর
Md Kamal uddin.	Asst Manager RIC.	01313-431626	[illegible]
Sapan Kumar Dey	Fireman Fire service.	01825-442490	[illegible]
Mosharof Hossain Lavlu	Chairman, Kutubjom union.	01819336767	[illegible]
Md. Saleh Ahamad	UP PF Commander	01823381104	[illegible]
Nurul Hoque	Chairman Saplapur	01819633662	[illegible] Hoque
Md. Rashedul Islam	PIO, Moheshkhali	01913602441	[illegible]
Anwar Pasha. cy.		০১৯২৫০০৮৬৬	[illegible]

Figure 22: CRA Workshop of Hoanak Union

Figure 23: FGD with elderly people at Noyapara Mosque Ward no-7

Figure 20: FGD with small and medium enterprise owners at Rajghorghina Bazar

Figure 21: Hill cutting section at ward no -2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