# Community Risk Assessment (CRA) Report of Shilkhali Union, Pekua, Cox's Bazaar.

Disaster Risk Management in Cox's Bazaar, UNDP

10/27/19

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# Chapter 01- Introduction

CRA (Community Risk Assessment) is a participatory process for assessing hazards, vulnerabilities, risks and the ability to cope; for preparing coping strategies and for ultimately developing local community-driven risk reduction options. CRA uses scientific information, predictions and participatory discourses to identify, analyze and evaluate the risk environment in a particular community to reach a consensus about actions needed for its management. The method recognizes that the vulnerability, loss, reduction or mitigation strategy and the according coping mechanism will vary from community to community and between internal groups (women, people with disabilities, the landless, farmers, fisher-folks). It therefore ensures the representation of various members of professional and identity-based groups, so that their points of views are taken into account. CRA encourages community participants to respect the concerns of others. This report details the application of CRA in the Shilkhali Union of Pekua upazila, Cox's Bazar, and is based upon information collected from a field survey and from secondary data sources (Comprehensive Disaster Management Programme (CDMP), 2006).

Cox's Bazar is well-known in Bangladesh for the longest natural sea beach, not only in the country but worldwide. It is also a very important fishing port and national tourist attraction. The unbroken sandy beachfront is around 96 miles long with a gentle slope. Cox's Bazar is located on the southeastern coast of Bangladesh, with an area of 2491.86 $km^2$. The district is surrounded by the Bakkhali river on the north and eastern sides, the Jhilwanj union on the south and the Bay of Bengal in the west (Wikipedia, 2019b).

Since it is in the coastal zone the climate of Cox's Bazar is a little different from the country at large, with extremes of temperature, heavy rainfall, excessive humidity and seasonal variations. It is a truth upheld by local people and within various literatures that being located on the open coast makes the area vulnerable to different hydro-meteorological hazards. Cyclones with storm surges, landslides, excessive rainfall and flash floods are very common in Cox's Bazar (Wikipedia, 2019b).


Figure 1: Upazila Map of Pekua. (Source: (Banglapedia, 2015))

There are eight upazilas within Cox's Bazar district, one of which is Pekua. Formed in 2002, it encompasses the seven unions of Chakaria (Bangladesh National Portal, 2019b). According to local people, the area is named after the local word for mud, *"Pek"*, because of its propensity to get muddy after tidal flow. The upazila is bounded by Chakaria on the east, Banshkhali and Chakaria to the north, Moheskhali on the south and Kutubdia channel to the west. There are not many rivers, though the Matamuhuri and Kutubdia channel are notable waterbodies which help satisfy the area's water demands, along with some different sized canals (*chhora*). Among them, the *Bhola khal* plays a vital role (Banglapedia, 2015).

Pekua consists of seven unions, however this project was stationed in just two of these: Shilkhali and Taitong. The area of the upazila is about 139.68 $km^2$ and its total population is 1,71,538, of which 86,310 are male and 85,228 female. The literacy rate of the upazila is about 50%. Pekua is mostly dependent upon agriculture for livelihoods but fishing, poultry and salt fields are also common in some areas. There are 298.26 km of Kaccha road, 123.89 km of Herring Bone Bond (H.B.B) and 89.36 km of Pucca road in the upazila (Bangladesh National Portal, 2019a).

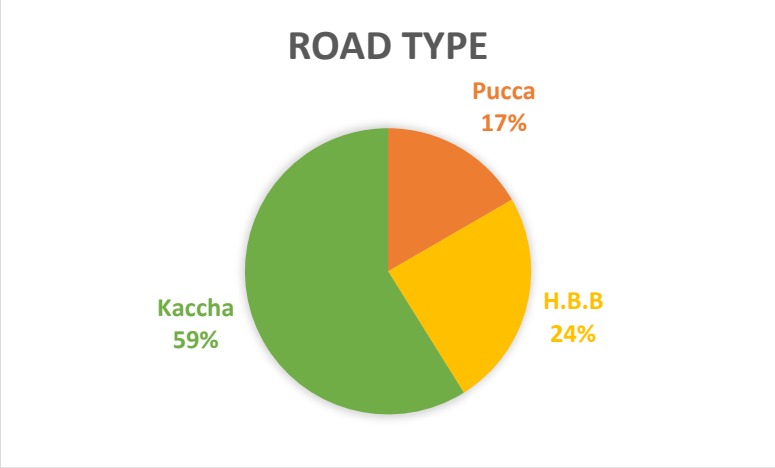


Figure 2: Road types of Pekua (Source: (Bangladesh National Portal, 2019a)

Pekua was historically connected only by waterways, but with time road communication has developed and contributed to the economy. The upazila is now relatively well connected, with both Cox's Bazar Sadar (85km) and Chittagong district (95km) accessible by road. Pekua is also linked to Kutubdia island by waterway (Banglapedia, 2015) (Bangladesh National Portal, 2019a).

## 1.1 Short History of the Union:

The Shilkhali union, of 1945 acres, is reportedly the smallest in Pekua (Bangladesh National Portal, 2019a). The union is in the eastern most part of the upazila, 6km from the Pekua Sadar. Neighbouring unions include Barabakiya on the west, Pekua Sadar to the south, Baraitali and Harbang of Chakaria upazila on the east and Harbang, also of Chakariya, to the north. The union used to be part of Barabakiya before being established as a separate union (Bangladesh National Portal, 2019a).

It is alleged that the name of the union arose from its geographical make up. Though unconfirmed by any credible literary sources, the name Shilkhali is claimed to be derived from the local term for gravel and boulders, *Shil*, due to its hilly disposition.

During the field study, some small canals were found to be surrounding the whole union. These are the Jarulbunia, Matamuhuri fari, Bhola, Shapergara and Barobakia canals. According to local people, these canals are used to provide water for crop cultivation. Most of the canals are now silted due to human activity. There are also nine *bils* and one river situated near this union which get silted most of the time and create flooding.

## 1.2 Demographic Information:

The villages of the Shilkhali Union are-

- Barabakia
- Kachari Mura
- Purba barba Khali
- Shilkhali
- Purba Shilkhali
- Paschin Shilkhali
- Hajirghona
- Munshimura
- Jarul Bania

The total population of the union is 7595 (BBS, November 2011), of which 3837 are male and 3758, female. According to the records of Union Parishad, the number of children aged 0-5 is 1840; newborn babies, 45; pregnant women, 235; adolescent (teenage) girls, 1682; and adolescent (teenage) boys, 1704. The literacy rate of the union is 33.52%.

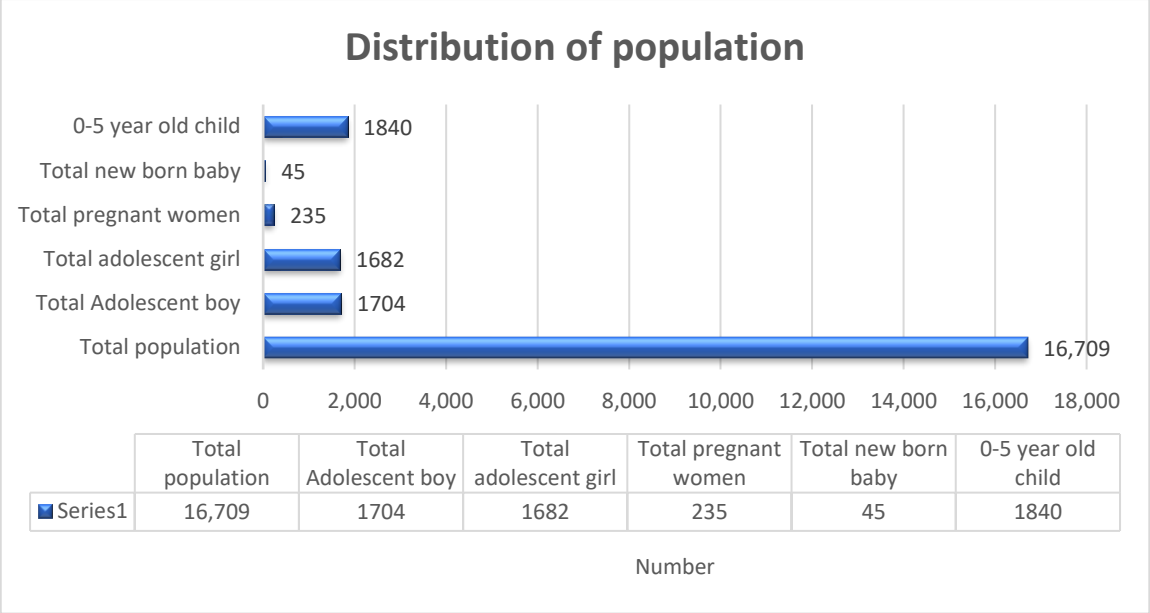


Figure 3: Distribution of population of Union (Source: Field survey, 2019)

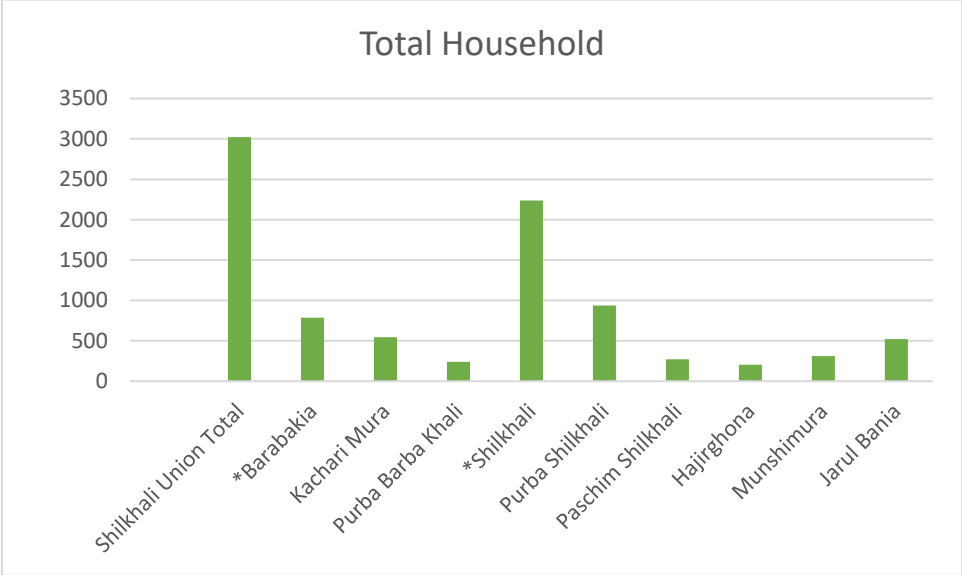


Figure 4: Administrative unit wise household numbers (Source: BBS, 2011)

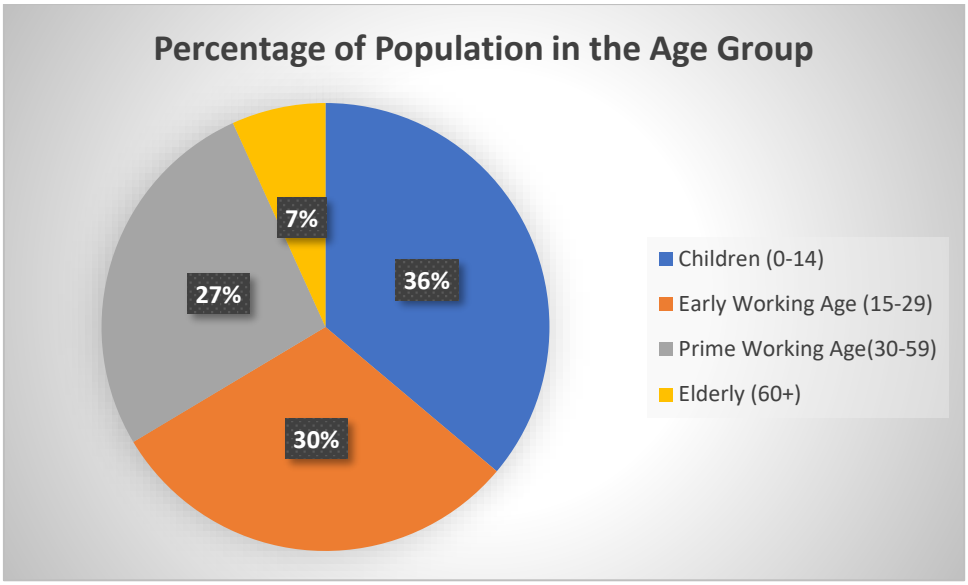


Figure 5: Percentage of population in the age group (Source: BBS, 2011)

This entry provides the distribution of the population according to age. Information is included by sex and age group 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 the Population and Housing Census of 2011, 36% of the total population belong to the children group, 30% to the early working age group, 27% to the prime working age group and 7% are in the elderly group.

## 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 Shilkhali union, including infrastructure, housing stock, livelihoods, literacy and electrification.

a. Literacy Rate: The literacy rate in the Shilkhali Union is 33.52%. It is 52% of the male population and 48.3% of the female, illustrating the wider tendency of literacy being slightly lower for females.

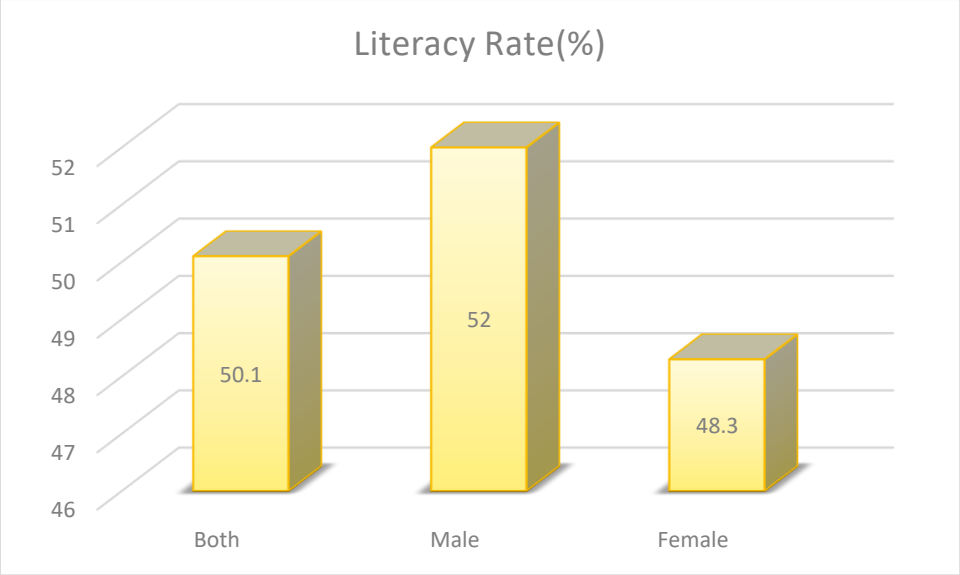


Figure 4: Distribution of population according to literacy rate (Source: BBS, 2011)

b. Type of Structure: In the Shilkhali union, 9.3% of general households live in pucca and/or semi-pucca houses made of solid and permanent materials, 90.7% in kutcha houses made of natural material and/or jhupri, made of temporary materials.

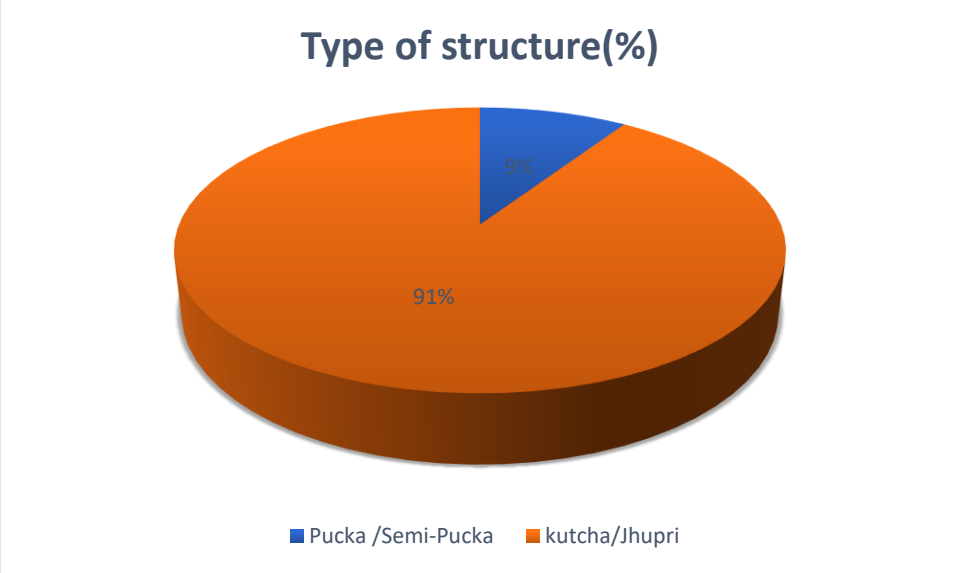


Figure 5: Percentage Distribution of Households by Type of Structure and Housing Tenancy Status (Source: BBS, 2011)

c. Toilet Facility: In the Shilkhali union, 84.2% of general households use sanitary latrines, 9.4 % non-sanitary latrines and the remaining 6.4% have no toilet facility. The ratio of households with non-sanitary latrines and no toilets is lower than households with sanitary latrines.


Figure 6: Percentage Distribution of Households by Toilet Facility (Source: BBS, 2011)

d. Source of Drinking Water: 95.6% of general households access drinking water from a tube-well, 0.1% from taps and the remaining 4.3% of households from other sources (i.e. pond, well, rainwater harvesting).

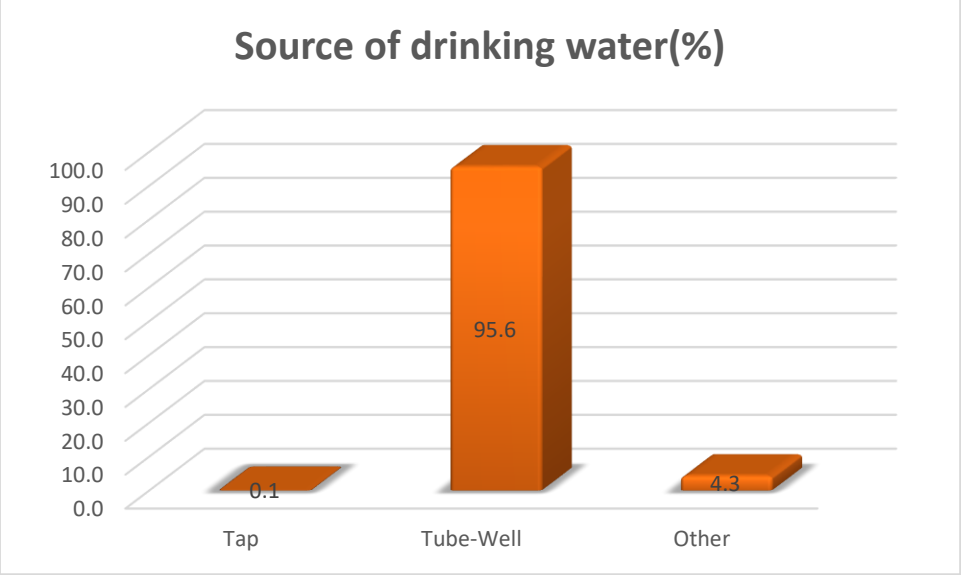


Figure 7: Percentage Distribution of Households by Source of Drinking Water (Source: BBS, 2011)

e. Electricity Connection: The Area has been brought under the Rural Electrification Program. However, in 2011, a total of only 20.3% general households were reported to have electricity connection in the entire Union. The electricity connection rate

varies between different wards. The rate is 19.3% for Barobakia, 26.1% for Kacharimura, 3.8% for Purba Barba Khali, 20.3% for Shilkhali, 25.5% for Purba Shilkhali, 10% for Paschim Shilkhali, 45.7% for Hajirghona, 19.1% for Munshimura and 9.1% for Jarula Bunia.

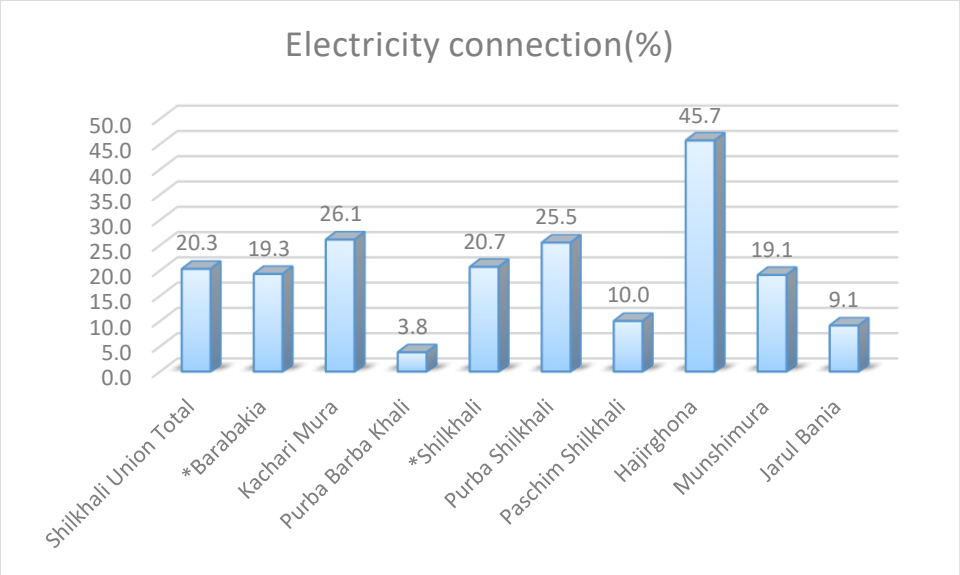


Figure 8: Percentage Distribution of Electricity Connection (Source: BBS, 2011)

f. Poverty: Based on the socio-economic status of Shilkhali union, 20% people are extremely poor, 30% are poor, 35% are marginal poor and 15% can be defined as non-poor.

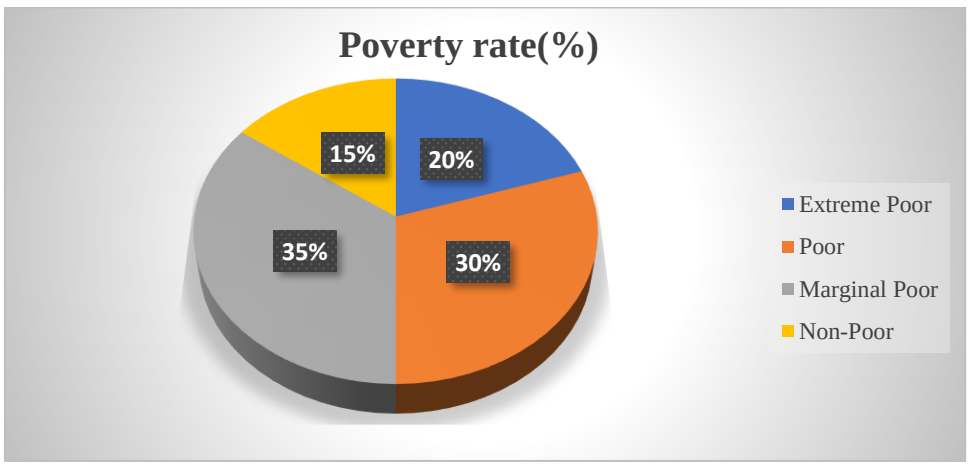


Figure 9: Socio-economic condition of the Shilkhali union (Source: Field survey, 2019)

While conducting field work, it could be noted that the economy of Shilkhali is very diversified. Urbanization lies at 20.34%. However there is little difference between urban and rural Shilkhali. About 60%% of the people of this union are engaged mostly in agriculture

(60%), most of them in crop production, which dominates the economy of Shilkhali. The main crops of Shilkhali are paddies, potatoes, bitter plants, egg-plants, tomatoes, beans and betel nuts. The principal cultivated fruits are mangos, bananas, papayas, plums and coconuts. Residents are also engaged in fishing activities and 10% of the total population is either directly or indirectly dependent on the fishing profession.

## 1.4 Local Resources:

During the field survey, many local resources have been collected to determine vulnerable resources and better identify the union. In this report, point features (regarded as local resources) are illustrated. Local resources can be divided in three sections: Physical, Natural and Institutional. The brief descriptions of these elements are given below:

***Physical resources:*** In terms of physical resources there are seven concrete roads, thirty muddy roads, seventeen bricks road, thirty-six tube wells and eleven culverts in the Shilkhali union.

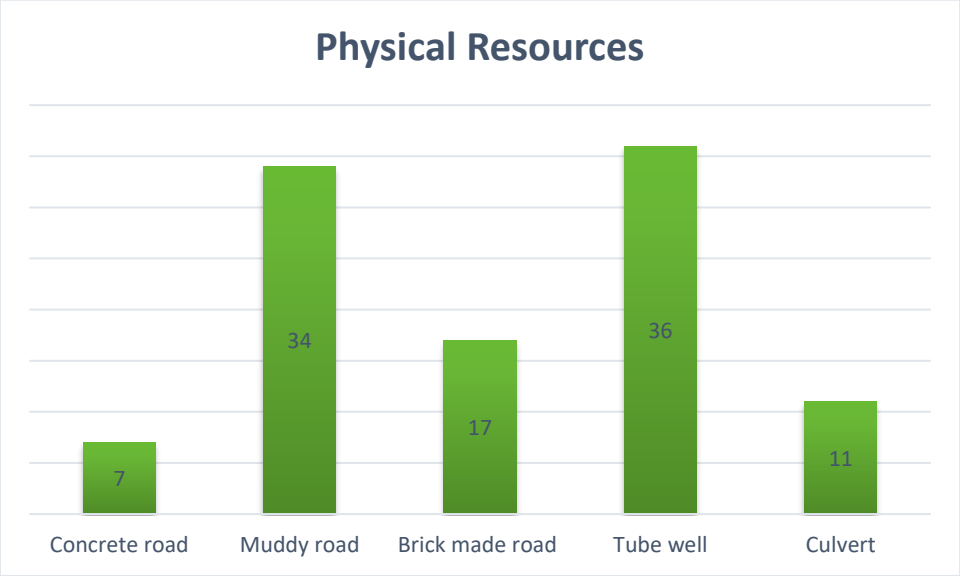


Figure 10: Number of physical resources (Source: Field Survey, 2019)

***Institutional resources:*** There are twenty primary schools, two high schools and three madrasas in the Shilkhali Union.

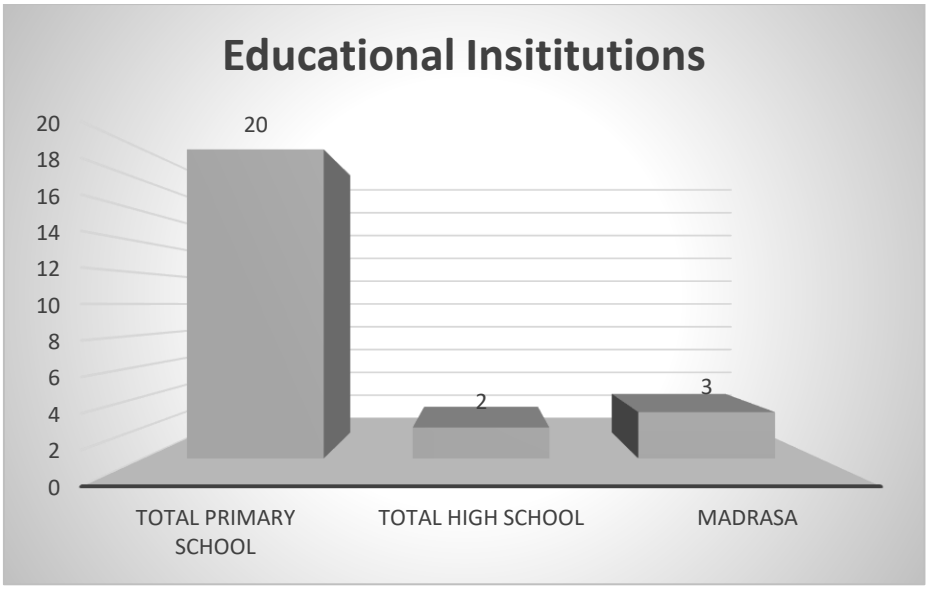


Figure 11: Number of Educational Institutions in Shilkhali Union (Source: Field Survey, 2019)

As for other institutions, there are twenty-six mosques, two temples, three community clinics, one union parishad, one club, thirteen graveyards and nine farm houses in the union.

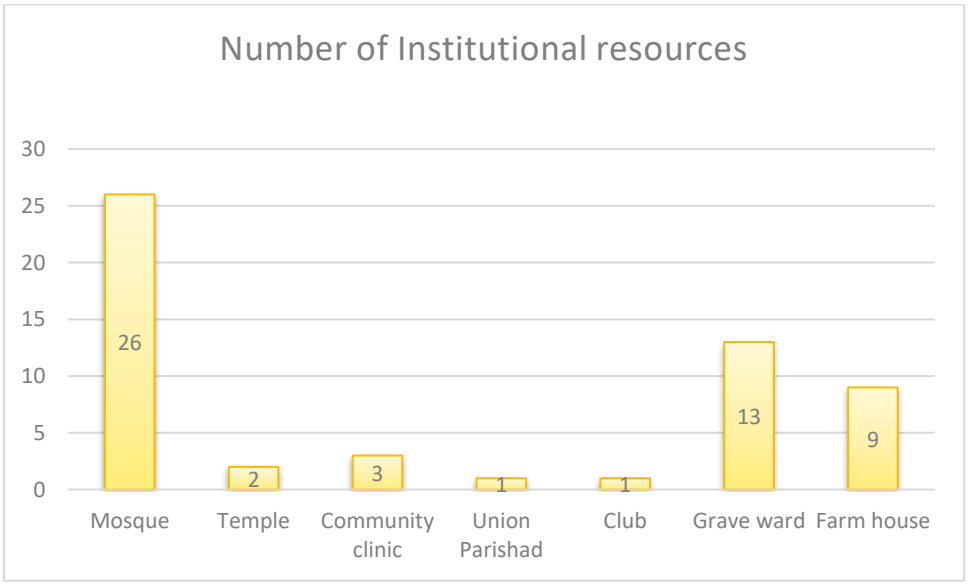


Figure 12: Number of other institutions (Source: Field Survey, 2019)

**Base Map: Shilkhali Union, Pekua Upazila, Cox's Bazar**

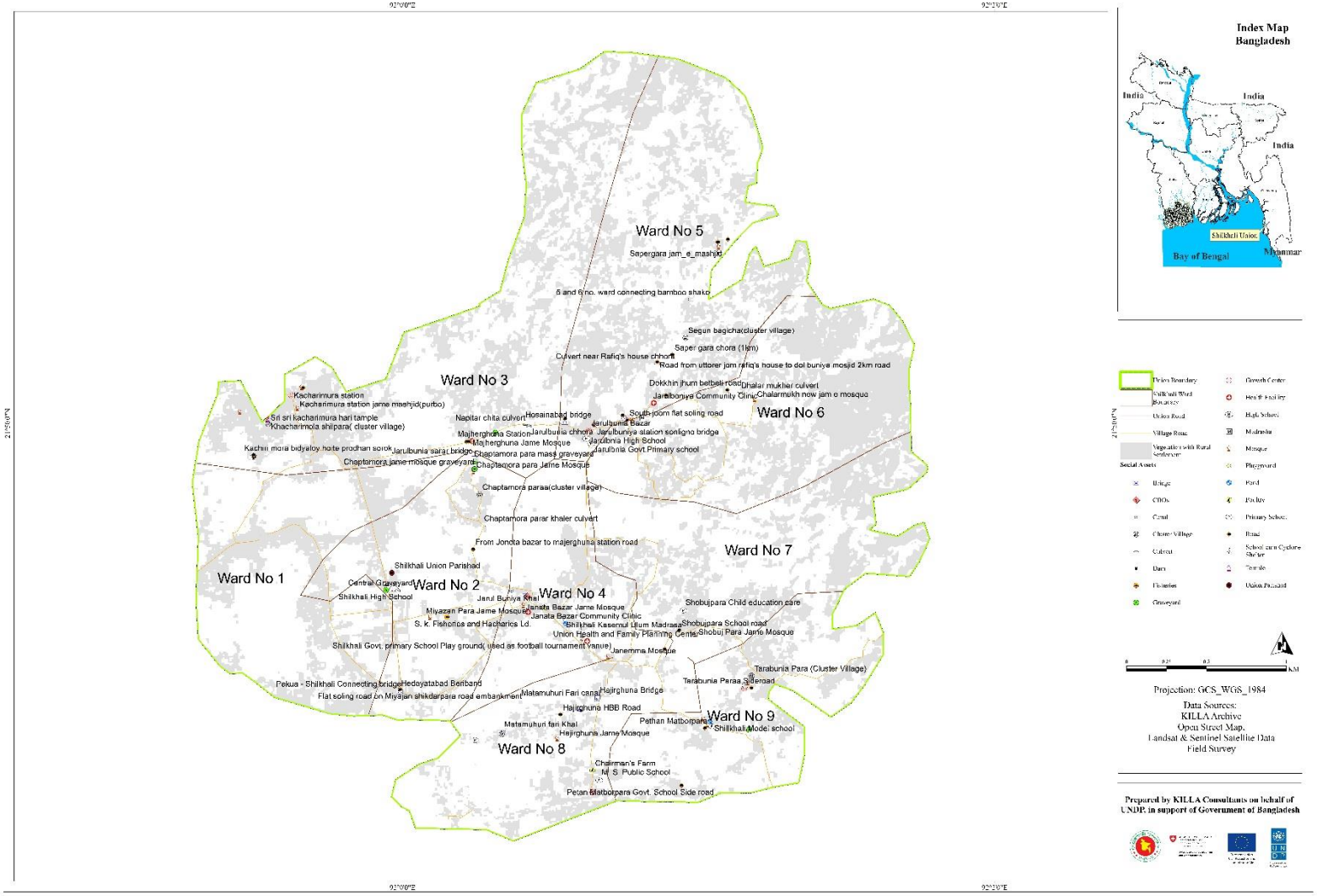


Figure 13: Base map of the Shilkhali Union (Source: Satellite data, open street map and field survey, 2019)

# Chapter 02- Local Hazards and Vulnerabilities

This chapter details local hazards and vulnerabilities in the Shilkhali Union. Floods, flash floods, landslides, heavy rainfall, cyclones and pest attacks are the main concerns that increase the vulnerability of the local community.

## 2.1 Historical Analysis of Hazards:

Due to its geographical location, the Shilkhali Union is affected by various hazards. Each year, different disasters impact the union, affecting the local population, economy and other sectors. The disasters that affect the locality frequently include: floods, flash floods, landslides, heavy rainfall, cyclones and pest attacks. During the field survey, it became clear that in the year 2019 alone floods, flash floods, landslides and heavy rainfall affected each of the nine wards of the union to varying intensities.

There are different canals surrounding the Shilkhali Union such as: the Jarulbunia canal, Matamuhuri fari canal, the Shapergara Canal, Bhola canal and the Barobakia canal. In rainy season, these canals frequently overflow since they are not properly dredged and silted. As a result, great damage is caused to the surrounding areas. The water bodies of the locality lose water holding capacity and are greatly damaged by man-made activities, which also increase the frequency and intensity of hazardous events. Overflow of the water bodies causes great damage to roads, crop lands, bridges, social and physical constructions and impact negatively upon the local economy.

Cyclones visited this union noticeably in historic times, the deadliest of which being the 1991 cyclone known as Gorky. It caused significant damage to the local economy, property, lives and livelihoods. The cyclone of May 1997 also affected thousands of structural properties, livestock and cropland, as well as many human lives. More recent cyclones such as SIDR, Aila didn't follow the same path, but affected instead the southwest coast. Indeed, recently this area has not faced too much damage due to cyclones, with the exception of Roanu in 2016.

While conducting Community Risk Assessment in some of the areas of the union, pest attacks have been found to be a notable concern, causing great damage, especially to betel

leaf gardens. During monsoons, the pest locally termed as *"Chakka"* attacks the betel leaf, resulting in huge losses to its production. Sometimes heavy rainfall and repeated *"Chakka"* attacks significantly damage betel leaf gardens, providing a limited blessing to a select few as increased market demand creates a temporary price hike.

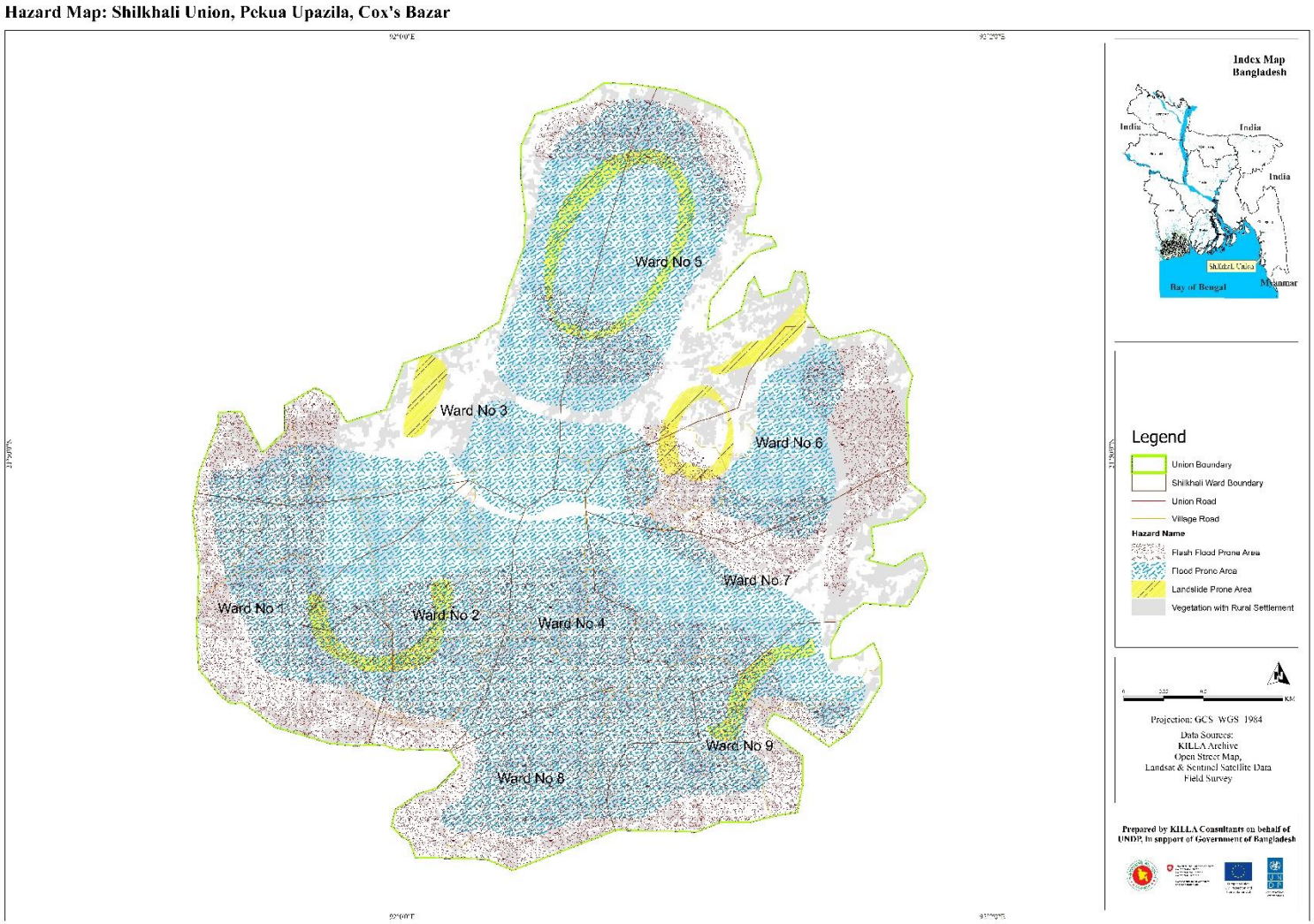


Figure 14: Hazard Map of the union (Source: Satellite data, open street map, community participation and field survey, 2019)

## 2.2 Hazard Venn and Calendar/Seasonality:

As previously mentioned, the main hazards of the Shilkhali union are floods, flash floods, landslides, cyclones, heavy rainfall and pest attacks. These hazards visit the union during different periods of time. A hazard calendar and Venn diagram of the their frequency and intensity have been shown in this section.

***Hazard Venn:***

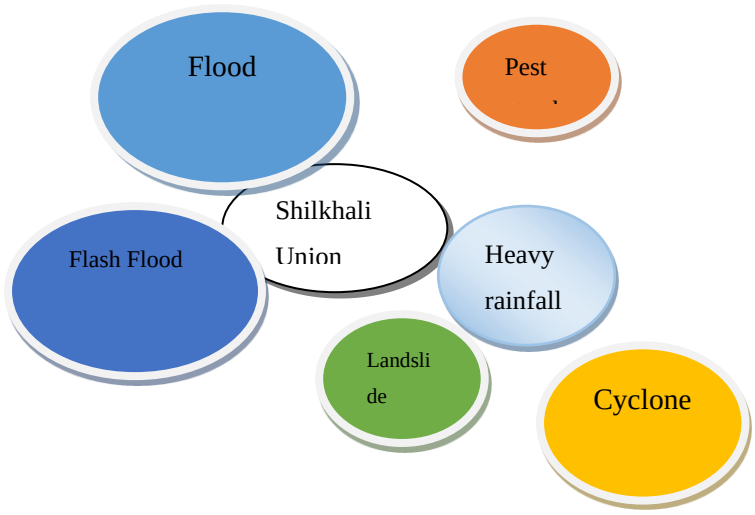


Figure 15: Hazard Venn of Shilkhali Union. (Source: Community Risk Assessment, 2019)

The above figure represents the hazard Venn diagram. Floods and flash floods visit the Shilkhali union regularly in an elevated intensity. This means that almost every year the union is affected by these hazards, and that the resulting losses are high. Heavy rainfall also impacts the area, triggering other hazards like landslides and flash floods. Landslides and pest attacks are not so frequent but they also create economic damage to the betel leaf and other crops. Cyclones are no longer reported as common, but they caused huge damage in 1991 and 1997.

***Hazard Calendar:***

Table 1: Hazard Calendar (Source: Field survey, 2019)

| Hazard Name | *Baishakh (Mid-April)* | *Jaishtha (Mid-May)* | *Ashar (Mid-June)* | *Srabon (Mid-July)* | *Bhadra (Mid-August)* | *Ashwin (Mid-September)* | *Kartik (Mid-October)* | *Agrahayan (Mid-November)* | *Poush (Mid-December)* | *Magh (Mid-January)* | *Falgun (Mid-February)* | *Chaitra (Mid-March)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flood | | | | | | | | | | | | |
| Flash Flood | | | | | | | | | | | | |
| Cyclone | | | | | | | | | | | | |
| Heavy rain | | | | | | | | | | | | |
| Land slide | | | | | | | | | | | | |
| Pest attack | | | | | | | | | | | | |

The curved and straight lines signify the intensity of different hazard events in different time periods. A curved shape represents the peak time of any particular hazard and, as it goes down over time, signifies that the hazard's intensity also decreases. As an example, heavy rainfall starts from *Ashar (Mid-June)* and lasts until *Bhadra (Mid-August)*. The intensity of heavy rainfall is higher in the month of *Srabon (Mid-July)*, before becoming less substantial, hence the curved line.

It has been illustrated that floods occur between the time of *Ashar (Mid-June)* to *Ashwin (Mid-September).* The frequency intensity is highest in the month of *Srabon (Mid-July)* before decreasing over time to its smallest frequency in the month of *Ashwin (Mid-September).* As for flash floods, they visit the locality between *Ashar (Mid-June)* and *Bhadra (Mid-August)*. Cyclones happen from *Chaitra (Mid-March)- Ashar (Mid-June)* to *Kartik (Mid-October) or Poush (Mid-December).* Encompassing different time periods, there is no particular peak time for this hazard. Therefore, the extent of the straight line used in that figure doesn't differ much. Heavy rain begins in the month of *Ashar (Mid-June)* and continues until the month of *Bhadra (Mid-August).* Landslides usually occur between the months of *Ashar (Mid-June) and Bhadra (Mid-August).* Pest attacks are most frequently seen in the months of *Ashwin (Mid-September)-Kartik (Mid-October)* and *Falgun (Mid-February)-Chaitra (Mid-March).*

## 2.3 Crop Seasonality and Exposure to Hazards:

***Crop Calendar:***

Table 2: Crop calendar of Shilkhali Union (Source: Field survey, 2019)

| Crop Name | *Baishakh (Mid-April)* | *Jaishtha (Mid-May)* | *Ashar (Mid-June)* | *Srabon (Mid-July)* | *Bhadra (Mid-August)* | *Ashwin (Mid-* | *Kartik (Mid-October)* | *Agrahayan (Mid-* | *Poush (Mid-December)* | *Magh (Mid-January)* | *Falgun (Mid-February)* | *Chaitra (Mid-March)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BR-22,49,52,32 | | | — | — | — | — | — | — | | | | |
| Boro-63, 28, Hira-2,5 | — | | | | | | | | — | — | — | — |
| Betel leaf | — | — | — | — | — | — | — | — | — | — | — | |
| Flower mob | — | | | | | | | — | — | — | — | — |
| Potato, Kakrol, Cucumber, Chilly, Eggplant, Tomato, Bitter melon | — | | | | | — | — | — | — | — | — | |
| Green Chili | — | | | | | | | — | — | — | — | — |

The above table illustrates the varying time periods in which different types of crops are produced. As for rice types BR-22, 49, 52 and 32; the production period commences in *Ashar (Mid-June)* and extends until *Agrahayon*. As for Boro-63, 28, Hira-2 and 5; the

cultivation period is between *Poush (Mid-December)* and *Baishakh (Mid-April)*. Betel leaf has been cultivated in the Shilkhali union all year-round. Sometimes, rice crop variety production differs according to area. This union is also well known for *"Fuljharu"* (one kind of broom) production, supplying the crop to different areas like Chittagong, Cox's Bazar and Bandarban. Fishery and poultry farming are also notable in some places.

***Hazard Exposure to Crops Variety:***

Table 3: Hazard exposure to crop variety (Source: Field survey, 2019)

| Crop Season | Crop Name | Hazard's Name |
|---|---|---|
| Kharip-2 (July-October) | BR-22, 52, 33, 39 | Cyclone, Flood, Heavy rain, Flash Flood, Pest attack |
| | BR-49,47 | Heavy rain, Flood, Flash Flood |
| Robi (October-March) | Potato | Heavy rain |
| | Eggplant | Heavy rain, Pest attack |
| | Radish | Heavy rain |
| | Chili | Heavy rain |
| | Betel leaf | Rain( W. N.:1-3), Land slide(4-6), |
| | Kakrol | Heavy rain, Flood |
| | Cucumber | Flood |
| | Tomato | Flood |

The above table depicts the variation in different crop exposure to various hazard events. Crop items are affected by hazards in different periods of time and the amount of loss due to hazard exposure also varies.

Krarip-2 crops (consisting of rice varieties BR- 22, 52, 33, 39) are mostly exposed to cyclones, floods, heavy rainfall, flash floods and pest attacks. BR-49 and 47 are vulnerable to heavy rainfall, flash floods and more general floods. On the other hand, Robi crops (like potatoes, eggplants, radishes, the betel leaf, kakrol, cucumbers and tomatoes) are primarily exposed to heavy rainfall, floods and pest attacks.

## 2.4 Land Use Pattern:

Within around the last two decades the land-use pattern in this union has changed a lot, and is still changing. According to local people and map analysis, it is clear that in 1999 the union was still mostly covered with the forest that still dominates in its hilly region. As time progressed, people began to cultivate crops in the low lands, as well as in the hilly sides by cutting forests. At the same time, settlement of migrators and others contributed to increases in the population. As a result, vegetable cultivation has increased in the hilly region along with the production of regular crops and, in some areas, salt cultivation.

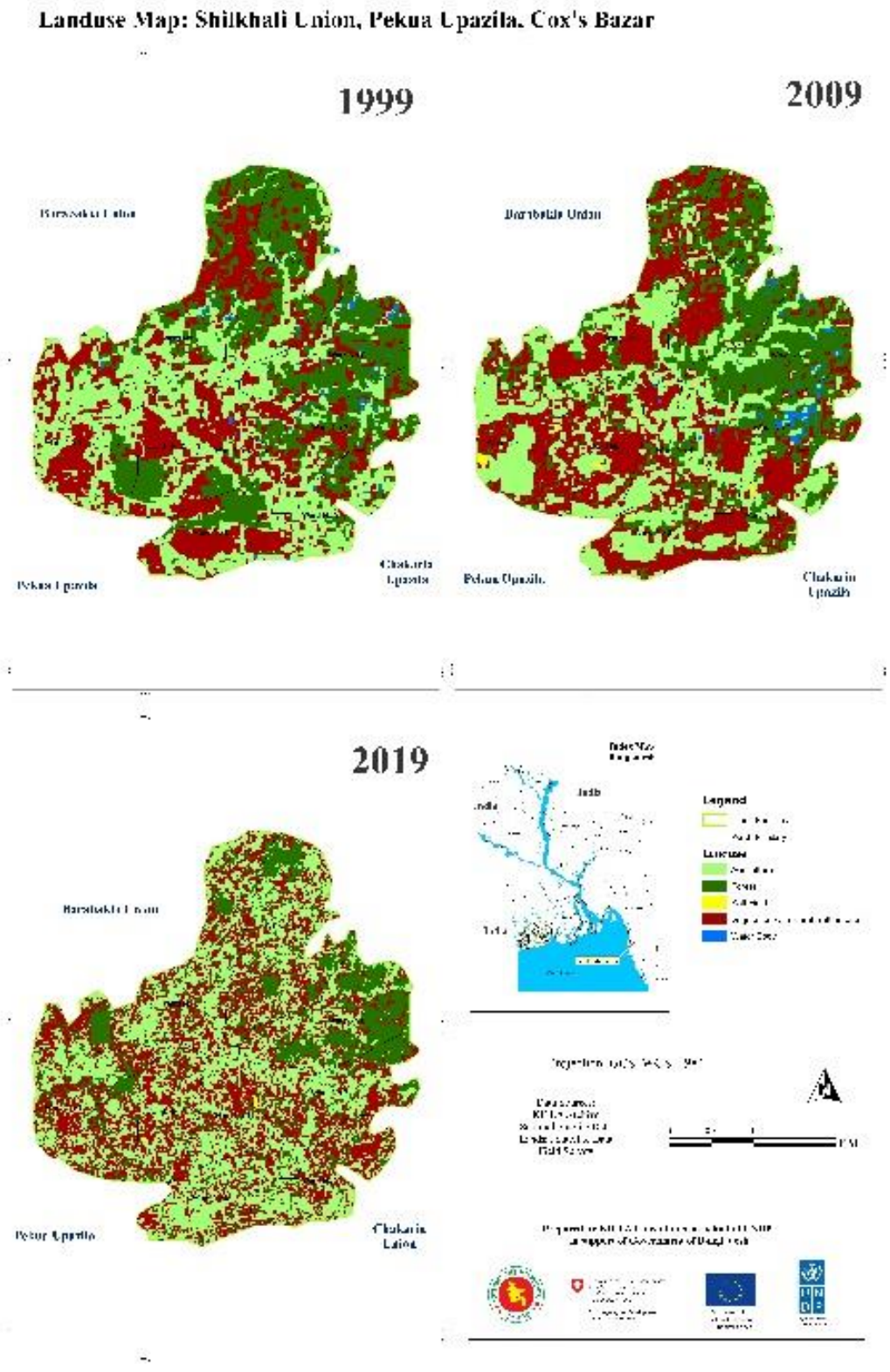


Figure 16: Land-use maps of Shilkhali union (Source: Satellite Data, Community Risk Assessment, 2019)

In the Shilkhali union, 80% of the land is cultivable despite its vulnerability to heavy rainfall and insect attack. Different patterns of crop land are seen in this union.

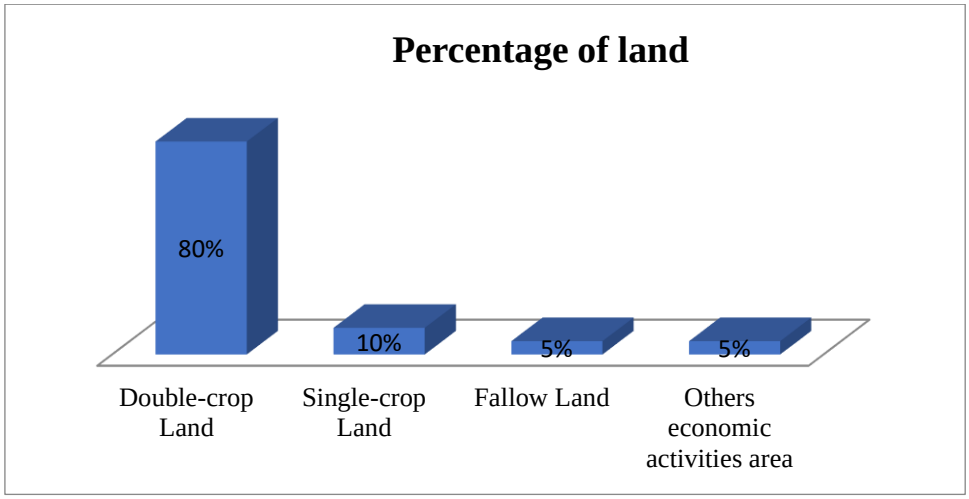


Figure 17: Cultivation pattern of Shilkhali Union**.** (Source: Field survey, 2019)

Looking closer at the patterns deployed, the 80% used as double-crop land is exposed to insect attack, heavy rainfall, water logging and strong water flow. The 10% used as single-crop land is vulnerable to heavy rainfall. Fallow land makes up 5% of the land, and the remaining 5% is used for other economic activities which face communication and transportation problems. Tri-crop land and industrial areas were not found during the study of this union.

## 2.5 Livelihood Options and Vulnerability:

According to local people who participated in the CRA process, about 60% of the population of the union is involved in farming. The specific vulnerabilities of this group of people are: crop lands which are prone to flash floods; waterlogging, which causes great harm to crops; insect attacks; low benefit from agricultural products; insufficient knowledge; and a lack of instructional and technological intervention. Another 10% of people are involved in fishing and their vulnerabilities are: diseases among the fish populations; pond overflows during floods, flash floods and heavy rainfall, which free many fish species; insufficiently skilled labor; poor technology; market manipulation and syndicate. The remaining 30% of people are engaged in day labor and their vulnerabilities

are working outside of the home during disasters, communication problems, being stuck at home, syndicate and being underpaid.

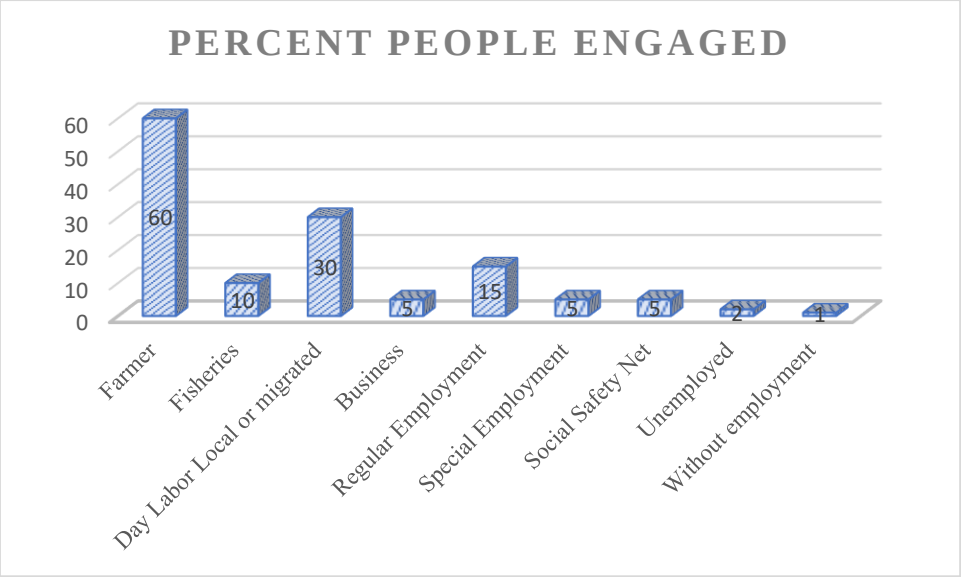


Figure 18: Livelihoods pattern of Shilkhali Union (Source: Field survey, 2019)

Approximately 5% of people are engaged in business and their principal vulnerabilities are low capital; and poor communication due to floods, flash floods, heavy rainfall and landslides. 15% of this group is involved in regular services and their main difficulties are communication problems and job insecurity. 5% of them are involved in the special service and another 5% are involved in social safety net programs. The vulnerabilities to their well-being include corruption, nepotism, abuse of social power and questions of status. About 2% of the total population is unemployed as a result of a lack of education and scope of job. This means that the social safety is vulnerable to poverty-based crimes, such as stealing and robberyThe average wage for a male laborer is 600-700 taka, whereas the female laborer earns around 300-400 taka on seasonal days. However, during off seasons, the male wage is 500taka, whilst female labors get 300 taka only.

## 2.6 Vulnerability of Population and Economy to Climatic Hazards

### Population Specific Special Vulnerabilities:

Specific population groups have specific vulnerabilities according to their inherent habits, characteristics and livelihood patterns. These are given below:

***Male*:** Decrease of monthly income due to demand-supply chain; lack of income sources according to availability; physical and mental pressure of family stress and responsibility as head of the family; gender variance; and lack of technological skill

***Female:*** Being physically weaker, dressing practice (sari), social status, gender discrimination, women's health and special needs

***Child (Boy):*** Dependence on parents or guardians for basic needs' fulfilment; lack of life-saving skills; physical, intellectual and emotional immaturity; vulnerability against violence; and lack of child friendly spaces

***Child (Girl):*** Dependence on parents or guardians for fulfilling basic needs; lack of life-saving skills; physical, intellectual and emotional immaturity; social barriers; vulnerability against violence; and lack of child friendly space

***Person with Disabilities (Male):*** Need of assistance for movement and other activities, insufficient support, vulnerability against violence, technological disempowerment and reduced perceived importance

***Person with Disabilities (Female):*** Need of assistance for movement and other activities, insufficiently perceived importance, lack of support, technological debility, gender issues, vulnerability to violence and social barriers

***Farmer (Male):*** Lack of agricultural knowledge, or understanding of new agricultural and biological technologies to cope with different climatic diversities; insufficient financial support to protect agricultural products; and lack of access to available agricultural information

***Agricultural-laborer (Male):*** Unavailability of work, lack of own land, dependence on inefficient primitive or traditional methods, lack of access to modern technology and being under-paid

***Agricultural-laborer (Female):*** Long-term unemployment; gender bias in industry; dependence on the male member of the family; reliance on inefficient primitive or traditional ways; lack of access to modern technology; and under payment

***Fisher Folk (Male):*** Not having enough personal tools and knowledge of fishing, lack of robust communication system to get timely warnings, technological illiteracy and unawareness of self-safety

***Day laborer (Male):*** Being under-paid, high competition for jobs and unwillingness to engage in agricultural production

***Day laborer (Female):*** Being under-paid, gender bias at work, reduced physical ability to withstand extreme labor and lack of protection against violence and discrimination

***Small Trader (Male):*** Lack of business continuity plan, disruption and issues of communication and transportation

***Small Trader (Female):*** Lack of business continuity plan, gender-related issues such as social stigma, disruption and issues of communication and transportation

## Food Production and Security:

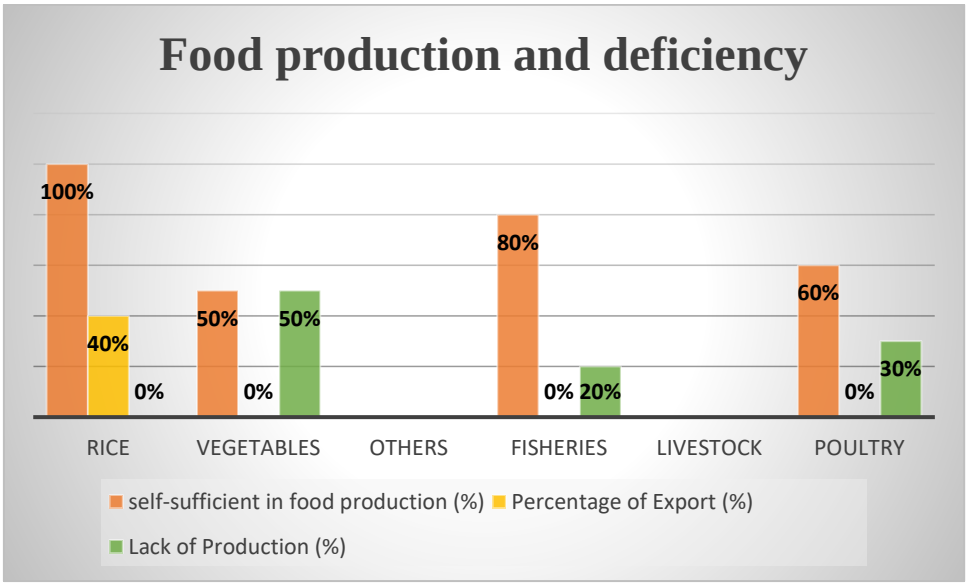


Figure 19: Food production and security of Shilkhali Union. (Source: Field survey, 2019)

In Shilkhali union, crop and vegetable cultivation, along with the livestock, fishery and poultry sectors are important for food production and sufficiency. Significantly, rice production is 100% self- sufficient in the union, meaning that demand for rice is met by local production. Indeed, 40% of rice was exported outside of the union in the previous

year. Rice production is sometimes affected by flash floods, floods and waterlogging. Internally-produced vegetables meet 50% of the local demand and the rest is imported from outside of the union. Vegetable production is also affected by insect attacks, heavy rainfall and waterlogging. The fishery sector is 80% self-sufficient but there is no export. This sector accordingly has a 20% production deficiency which is reportedly a result of fish diseases, temperature increase and flooding. The poultry sector is 70% self-sufficient, where 30% of production still needs to be fulfilled from other sources. This sector also faces problems like disease, temperature rise and floods.

# Chapter-03: Community Risk and Vulnerabilities

In this chapter, communities' different risks and vulnerabilities will be stated according to the field survey. In any union, all elements are not equally vulnerable or present in risk-zones. Specific risk elements, their vulnerabilities and the consequences of hazard events will be discussed. Risk statements for the different elements of the Shilkhali union, risk ratings, prioritization, as well as sensitivity and exposure analysis will also be described in this chapter.

## 3.1 Sector Wise Risks and Consequences:

During the field survey, many risk elements were identified according to their risk zone or risk state. Their possible consequences were also noted down. These can be categorized as:

***Natural Sector:*** Natural elements like the canals, *bils* and *chhora* of the Shilkhali union are as responsible for creating risks as they are at risk themselves. Indeed, it is their own risks which means that these elements create problems for the area. Floods, flash floods, heavy rainfall and manmade activities carry away silt into waterbodies and, while it rains, creates an overflow of water, communication problems and disruption to daily activities. As the canals become sedimented, they are unable to hold water so they overflow if there is just a little rain or flash from the hilly streams. Waterlogging occures in some areas as a result, and the overflown water damages nearby croplands and weakens roads due to poor construction material.

***Agricultural Sector:*** The agricultural sector is dangerously affected by natural hazards like floods, flash floods, land slides, pest attacks and sometimes cyclones. Rice production is badly impacted by floods, flash floods and pest attacks. Crops and vegetables are greatly damaged by floods, flash floods and waterlogging, as heavy rainfall destroys the new plants and vegetables become rotten by waterlogging.

***Transportation Sector:*** For physical elements, such as roads, culverts and bridges, there are some specific risks, the consequences of which will be discussed here. These elements are heavily affected by the occurrences of floods, flash floods, landslides and heavy rainfall. The consequences are such as the displacement of bricks, soil erosion and breaking of roads; and the disruption of communication due to damaged bridges, culverts and *shakos* (bamboo bridges). Water logging is exacerbated by this damage to infrastructure. The rate of accidents also increases due to the poor communication system. As the roads, bridges, culverts are affected by the hazards events, these will also affect the transportation system and, in turn, the education system, as children are incapable of going school. The poor physical structure of any bridge or culvert may also create disruption and accidents in the event of its collapse.

***Physical Sector:*** Hazard events can badly impact the physical condition of any existing physical elements in the union. Bazar, as a physical element, faces risks from hazard events, such as floods, flash floods and land slides, and consequences are damaged properties, disrupted communication, transportation problems, price hikes, syndicate, high demand and reduced supply of basic needs. As for cluster villages, they are in a risk zone with significant probability of being affected by floods, flash floods and landslides. Collapse threatens the houses of this community when soil erosion is caused by flash floods or heavy rainfall. In these events, the routes of communication and livelihoods of locals are also threatened or interrupted.

***Institutional Sector:*** Institutional elements including education, religion, CBOs, clubs and other organizations suffer from many risk factors, the consequences of which create great loss and damage. Mosques, schools, madrasas and orphanages can be affected by hazard events like floods, flash floods, land slides and heavy rainfall. As a result, half of the buildings become drowned or partly damaged and their roofs, spoiled. Also, the educational system is affected as school properties may become damaged or collapse entirely.

## 3.2 Risk Statements with High Priority Risk:

According to the CRA Guideline prepared by the CDMP, risk can be categorized into four stages by pair-ranking consequences and likelihood (Comprehensive Disaster Management Programme (CDMP), 2006):

Table 4: Risk Categories

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

Through the field survey, the elements at risk have been identified. Details of which elements are more at risk and what damage might be caused are stated in this section. To identify the risk rating of all risks, statements, consequences and likelihood are multiplied to categorize the highest-rated risks of the union. Some highly-rated risks are stated below:

Table 5: Risk statement with rating

| **Elements** | **Risk Statement** | **Consequences** | **Risk Rating** (Likelihood x Consequences) |
|---|---|---|---|
| School | The *Shobujpara Shishu Shikkha Kendro* (School) of ward no 7 was affected majorly by floods in 2018 and is at extreme risk of flooding. | Dropout of more than 250 students, potential damage to school properties. | 1 |
| School | The Shilkhali Model School of ward no 9 was majorly affected by floods in 2018 and is at high risk of future flooding. | School properties may get damaged, dropout of more than 250 students. | 1 |

| | | | |
|---|---|---|---|
| Cluster Village | The Hajirghona Para (cluster village) of ward no 8 was majorly affected by floods in 2019 and is at high risk of flooding. | Properties may be damaged, cattle and other livestock may become hampered. | 2 |
| Road | The Petan Matbotpara Govt. Primary School road of ward no 9 was majorly affected by floods in 2018 and is at high risk of future flooding. | Water logging, road damage; communication problems for more than 200 students. | 1 |
| Road | The Hajirghona HBB (Herring Bone Bond) road of ward no 8 was majorly affected by floods in 2018 and is at extreme risk of future flooding. | Damage of the road due to displacement of bricks; communication problems for more than 600 people. | 2 |
| Bridge | The bridge over the Barobakia canal near Shakopara of ward no 7 was majorly affected by floods in 2018 and is at high risk of future flooding. | Slabs, and connecting roads are damaged (already missing bridge); communication problems for more than 500 people of the locality. | 3 |
| Road | The Dokkhinjum Road of ward no 6 was majorly affected by floods in 2019 and is at high risk of future flooding. | Communication problems for more than 300 people. | 2 |

| | | | |
|---|---|---|---|
| School | The Haji Obaidul Hakim Govt. Primary School of ward no 8 was moderately affected by floods in 2018 and is at high risk of flooding. | School properties may get damaged; dropout of more than 250 students. | 5 |
| Culvert | The Napitar Chita culvert of ward no 5 was moderately affected by floods in 2019 and is at high risk of flooding. | Culvert collapse; communication problems for more than 350 people. | 7 |
| Road | The road from Shobuj para Jame Mosque to Dolubunia Station Road of ward no 3 was moderately affected by floods in 2019 and is at high risk of flooding. | Occurrence of accidents, displacement of the bricks from the road, communication problems for more than 450 people. | 2 |
| Bridge | The bridge situated near the Janata Bazar of ward no 4 was majorly affected by floods in 2018 and is at high risk of flooding. | Communication problem for around 600-700 people. | 4 |
| Road | The road from Shapergara bridge to Raja Khola Golam kader's house side road of ward no 5 was moderately affected by flash floods and floods in 2018 and is at high risk of flooding. | Water logging, displacement of the bricks from the road, communication problems for more than 400 people. | 3 |
| School | The Shilkhali Govt. Primary School of ward no 7 was majorly | Properties of the school may get damaged; | 9 |

| | | | |
|---|---|---|---|
| | affected by floods in 2018 and is at high risk of further flooding. | education system will be affected, dropout of more than 250 students. | |
| Bridge | The bridge which is beside the Jarulbunia Station Mosque of ward no 5 was moderately affected by floods in 2019 and is at high risk. | Breakdown of the bridge, communication problems for 400-500 people. | 10 |
| Bridge | The Panbazar bridge over the Jarulbunia canal of ward no 5 was moderately affected by floods in 2018 and is at high risk of future flooding. | Slabs get damaged, connecting roads become damaged too. | 7 |
| Road | The Shobuj para School Road of ward no 7 was majorly affected by floods in 2018 and is at high risk of flooding. | Water logging, communication problems for more than 400 people. | 3 |
| Madrasa and Orphanage | Kasemul Ulum Madrasa and Orphanage of ward no 7 was affected by landslide in 2018 and is at high risk of such hazards. | Buildings and properties damaged, dropout of more than 150 students from the madrasa. | 9 |
| Road | The road from Panbazar station to Shapermora of ward no 5 was moderately affected by floods and landslide in 2018 and is at high risk of such hazards. | Water logging, displacement of bricks from road, communication problems for more than 400 people. | 4 |

| | | | |
|---|---|---|---|
| Madrasa | The Jarulbunia Hayatunnobi Madrasa of ward no 6 was affected majorly by flash floods and landslide in 2018 and is at high risk of further flooding and landslides. | Madrasa properties get damaged; drop out of madrasa students. | 4 |
| Canal | The Jarulbunia Canal and Bhola canal (Shilkhali Union's part) in between wards no 4 and 7 was moderately affected by floods in 2018 and is at high risk. | Roads damaged, overflow of the nearby crop fields, canal sedimented due to silt. | 6 |
| Road | The road from Jarulbunia to Bedbedi of ward no 6 was moderately affected by floods in 2019 and is at high risk of future flooding. | Water logging; communication problems for more than 400 people. | 5 |
| Canal | The Matamuhuri fari canal of ward no 8 was majorly affected by floods in 2019 and is at high risk of flooding. | Water-logging damages nearby crop lands and roads; siltation of canal. | 11 |
| Road | The road from Uttorjum Rafiq's house to Dolubunia Station of ward no 5 was moderately affected by floods in 2019 and is at high risk. | Water logging; communication problems for more than 300 people. | 4 |

## 3.3 Sensitivity and Exposure Analysis:

Table 6: Exposure and Sensitivity Analysis

| Sensitivity Analysis | | | | | |
|---|---|---|---|---|---|
| **Element's name** | **(Risk Statement)** | **(Main Elements)** | **(Sensitivity-1)** | **(Sensitivity-2)** | **(Sensitivity-3)** |
| School | The *Shobujpara Shishu Shikkha Kendro* (School) of ward no 7 was affected majorly by floods in 2018 and is at extreme risk of future flooding. | Building Materials | Quality | Strength | |
| | | Building | Location. | Elevation | |
| | | Equipment | Type and quality | Inundation | |
| | | Yard/ Ground | Inundation | Elevation | Soil Type |
| School | The Shilkhali Model School of ward no 9 was majorly affected by floods in 2018 and is at high risk of future flooding. | Building Materials | Quality | Strength | |
| | | Building | Location. | Elevation | |
| | | Equipment | Type and quality | Inundation | |
| | | Yard/ Ground | Inundation | Elevation | Soil Type |
| Cluster village | The Hajirghona Para (cluster village) of ward no 8 was majorly affected by floods in 2019 and is at high risk of further flooding. | Building Materials | Quality | Strength | |
| | | Building | Location. | Elevation | |
| | | Equipment | Type and quality | Inundation | |
| | | Yard | Inundation | Elevation | Soil Type |

| | | | | | |
|---|---|---|---|---|---|
| School | The Petan Matbotpara Govt. Primary School road of ward no 9 was majorly affected by floods in 2018 and is at high risk of future flooding. | Bricks | Quality | Poor arrangement of bricks | Installation type |
| | | Soil | Compactness | Soil type and quality | Inundation (Over flow) |
| | | Sand | Inundation | Compactness | |
| Road | The Hajirghona HBB (Herring Bone Bond) road of ward no 8 was majorly affected by floods in 2018 and is at extreme risk of future flooding. | Bricks | Quality | Poor arrangement of bricks | Installation type |
| | | Soil | Compactness | Soil type and quality | Inundation (Over flow) |
| Bridge | The bridge over the Barobakia canal near Shakopara of ward no 7 was majorly affected by floods in 2018 and is at high risk of further flooding. | Bricks | Quality | Poor arrangement of bricks | Installation type |
| | | Concrete | Strength | Inundation | |
| | | Sand | Inundation | Compactness | |
| | | Iron | Quality | Strength | |
| Road | The Dokkhinjum Road of ward no 6 was majorly | Bricks | Quality | Poor arrangement of bricks | Installation type |

| | | | | | |
|---|---|---|---|---|---|
| | affected by floods in 2019 and is at high risk of future flooding. | Soil | Compactness | Soil type and quality | Inundation (Overflow) |
| | | Concrete | Strength | Inundation | |
| | | Sand | Inundation | Compactness | |
| School | The Haji Obaidul Hakim Govt. Primary School of ward no 8 was moderately affected by floods in 2018 and is at high risk of future flooding. | Building Materials | Quality | Strength | |
| | | Building | Location. | Elevation | |
| | | Equipment | Type and quality | Inundation | |
| | | Yard/ Ground | Inundation | Elevation | Soil Type |
| Culvert | The Napitar Chita culvert of ward no 5 was moderately affected by floods in 2019 and is at high risk of further flooding. | Concrete | Strength | Inundation | |
| | | Sand | Inundation | Compactness | |
| | | Iron | Quality | Strength | |
| Road | The road from Shobuj para Jame Mosque to Dolubunia Station Road of ward no 3 was moderately affected by floods in 2019 and is at high risk of future flooding. | Bricks | Quality | Poor arrangement of bricks | Installation type |
| | | Concrete | Strength | Inundation | |
| | | Soil | Compactness | Soil type and quality | Inundation (Overflow) |

| | | | | | |
|---|---|---|---|---|---|
| Bridge | The bridge situated near the Janata Bazar of ward no 4 was majorly affected by floods in 2018 and is at high risk of further flooding. | Bricks | Quality | Poor arrangement of bricks | Installation type |
| | | Concrete | Strength | Inundation | |
| | | Sand | Inundation | Compactness | |
| | | Approach ramp, slabs | Quality | Inundation | |
| Road | The road from Shapergara bridge to Raja Khola Golam kader's house side road of ward no 5 was moderately affected by flash floods and floods in 2018 and is at high risk of future flooding. | Bricks | Quality | Poor arrangement of brick | Installation type |
| | | Soil | Compactness | Soil type and quality | Inundation (Overflow) |
| | | Sand | Inundation | Compactness | |
| School | The Shilkhali Govt. Primary School of ward no 7 was majorly affected by floods in 2018 and is at high risk of further flooding. | Building Materials | Quality | Strength | |
| | | Building | Location. | Elevation | |
| | | Equipment | Type and quality | Inundation | |
| | | Yard/ Ground | Inundation | Elevation | Soil Type |

| | | | | | |
|---|---|---|---|---|---|
| Bridge | The bridge which is beside the Jarul bunia Station Mosque of ward no 5 was moderately affected by floods in 2019 and is at high risk of more. | Bricks | Quality | Poor arrangement of bricks | Installation type |
| | | Concrete | Strength | Inundation | |
| | | Sand | Inundation | Compactness | |
| | | Iron | Quality | Strength | |
| Bridge | The Pan bazar bridge over the Jarul bunia canal of ward no 5 was moderately affected by flood in 2018 and is at high risk of future flooding. | Bricks | Quality | Poor arrangement of bricks | Installation type |
| | | Concrete | Strength | Inundation | |
| | | Sand | Inundation | Compactness | |
| | | Iron | Quality | Strength | |
| Road | The Shobuj para School Road of ward no 7 was majorly affected by flood in 2018 and is at high risk of further flooding. | Bricks | Quality | Poor arrangement of bricks | Installation type |
| | | Soil | Compactness | Soil type and quality | Inundation (Overflow) |
| Madrasa and Orphanage | The Kasemul Ulum Madrasa and Orphanage of | Building Materials | Quality | Strength | |
| | | Building | Location. | Elevation | |

| | | | | | |
|---|---|---|---|---|---|
| | ward no 7 was affected by landslide in 2018 and is at high risk of such hazards. | Equipment | Type and quality | Inundation | |
| | | Yard/ Ground | Inundation | Elevation | Soil Type |
| Road | The road from Pan bazar station to Shapermora of ward no 5 was moderately affected by floods and landslide in 2018 and is at high risk of such hazards. | Bricks | Quality | Poor arrangement of bricks | Installation type |
| | | Soil | Compactness | Soil type and quality | Inundation (Overflow) |
| | | Sand | Inundation | Compactness | |
| Madrasa | The Jarul bunia Hayatunnobi Madrasa of ward no 6 was affected majorly by flash floods and land slide in 2018 and is at high risk of further flooding and landslides. | Building Materials | Quality | Strength | |
| | | Building | Location. | Elevation | |
| | | Equipment | Type and quality | Inundation | |
| | | Yard/ Ground | Inundation | Elevation | Soil Type |
| Canal | The Jarul bunia Canal and Bhola canal (Shilkhali Union's part) in between wards no 4 and 7 was moderately | Concrete | Strength | Inundation | |
| | | Sand | Inundation | Compactness | |
| | | Iron | Quality | Strength | |

| | | | | | |
|---|---|---|---|---|---|
| | affected by floods in 2018 and is at high risk of more. | | | | |
| Road | The road from Jarul bunia to Bedbedi of ward no 6 was moderately affected by floods in 2019 and is at high risk of future flooding. | Bricks | Quality | Poor arrangement of bricks | Installation type |
| | | Soil | Compactness | Soil type and quality | Inundation (Overflow) |
| | | Sand | Inundation | Compactness | |
| Canal | The Matamuhuri fari canal of ward no 8 was majorly affected by floods in 2019 and is at high risk of further flooding. | Water | Easily get silted | Lower breadth | Poor water holding capacity |
| Road | The road from Uttorjum Rafiq's house to the Dolubunia Station of ward no 5 was moderately affected by floods in 2019 and is at high risk of more. | Bricks | Quality | Poor arrangement of bricks | Installation type |
| | | Soil | Compactness | Soil type and quality | Inundation (Overflow) |
| | | Sand | Inundation | Compactness | |

### 3.4 Adaptive Capacity:

During the field survey, information about many adaptive capacities was given by local people. Some are given below:

- In ward no 5 of the Shilkhali union, people changed their crop production habits. For example, most of them converted from rice to betel leaf production, as the latter is more suitable to their geographic location. Moreover, it is profitable and it can be produced all year round.
- In most of the wards, crop production is badly impacted by pest attack. People use traditional methods of pest control and sometimes ask for help from the Union Parishad, leading to increases in crop production.
- People use natural resources like canals for paddy production by using them as seed fields.
- Use of new technologies in fisheries and poultry farming has been introduced to the people of this union, leading to an increase in food productivity.
- People of this union get help from different non-govt organizations such as ASA and Brac, which enables them to become more adaptive and resilient.
- People alter their cropping pattern in accordance with climatic events, by changing crop varieties or cultivation periods.

# Chapter 04: Risk Reduction Options and Action Plan

This chapter deals with risk reduction options and action plans. In this section, risk reduction options taken by the local communities of the Shilkhali Union will be discussed.

## 4.1 Risk Reduction Options:

Several risk reduction options, including exposure reduction and sensitivity reduction of certain elements, are taken by the local people already. Planting salt-tolerant rice varieties (such as BRRI dhan-47, 53, 54), for example, is one of the most fruitful risk reduction options for farmer communities to decrease loss caused by local hazards.

To reduce exposure of crops, paddies and vegetables can be cultivated in available high lands such as hilly regions or levees which are not susceptible to floods or waterlogging, thereby protecting the harvest from such hazard events as flashfloods or heavy rainfall. Early harvesting varieties of paddy can also be planted. Storing rain water in ponds, water pots and canals can be beneficial. Where water is accumulated in high tide, beds are used for the cultivation of vegetables and fruits in the *sorjan* process (a cropping system which enables growers to cultivate fish and vegetables on the same land in wet and dry seasons). To reduce the sensitivity of the crops, flood tolerant varieties can be introduced. As well as this, farmers need to be well-trained about plantation, irrigation and harvesting techniques, so that they can prevent any type of pest attacks, fungal infections and take necessary steps to get a good harvest.

To reduce the exposure of roads (both paved and unpaved), bridges and culverts, embankment on both sides of canals must be installed, as well as an increase in road height, to avoid inundation during severe floods and cyclonic situations. Canals must be dredged in winter so that they can sustain the extra water during rainy season, helping reduce water logging and the risk from coastal floods. For sensitivity reduction in roads, the planting of trees can be helpful. They should be planted on both sides of roads and embankments. As for embankments, they should be properly sloped in the direction of roads. To reduce their associated risk, approaching roads should be constructed properly (where they are currently lacking in many areas of this union). Guard walls should be constructed alongside roads situated beside canals. Slabs of bridges should be renovated. Proper monitoring of the physical condition of bridges should be maintained. Reconstruction of many roads is necessary, if possible in concrete. Roadside encasement which includes all roofing and toxic hazards materials, such as asbestos, lead-based paint, mold/mildew and other harmful substances which are stored near or above roads, should be lifted higher for the reduction of exposure. Renovation of the roads, bridges and culverts is necessary to minimize accidents and other risks.

Physical elements and buildings, i.e. educational institutes, offices, religious institutes and health complexes or other critical infrastructures, should be constructed on existing high lands and must be designed so that exposure due to hazards is reduced. The risk sensitivity of building properties to hazards can be minimized by using good quality materials for construction, covering floors with concrete and planting trees in open places around physical elements. As for local market areas, good quality of furniture in different shops should be maintained. The location of rural markets should be lifted to higher zones to protect from water logging, and soil erosion of soil or sand. Renovations of schools, madrasas and orphanage buildings, are necessary to maintain the quality of such properties. Action must be taken to protect from water logging.

As for natural elements, canal dredging should be performed to prevent overflow or waterlogging. Guard/guide wall construction and the eradication of human settlement from the canal areas will also be helpful.

Moreover, installing a community-based early warning system can reduce the risks of flash floods and cyclones. Risk transfer mechanisms for lives, assets and livelihood should be introduced.

The risk reduction options in brief are as follows (for most highlighted elements of the Shilkhali union):

***Natural Sector:***

- Dredging of the local *chhoras* (canals), the Jarulbunia, Bhola Khal, Matamuhuri Rivers and some other surrounding canals (as suggested by all groups of people).

***Transportation Sector:***

- Renovation of some important damaged roads, bridges and culverts, and others which lie in high risk zones. Investment should be increased for improving the transportation and communication sectors. More specifically, the roads and bridges which should be repaired for risk reduction are as follows:-
    - The road near the primary school in ward no-09.
    - The road located in ward no-03 from the Kasarimora station to Mr. Mahboob's house.

- The road located in ward no-07 from Master Mosleuddin's house to the Majhergona station.
- The bridge that is located above the Jarulbunia *chhora* (canal) which is situated in the southern part from the Majhergona station.
- The bridge above the canal which is in the southern part of the Chaptamora para.
- Guide wall (in local language length may be 20 chains) should be constructed around the road from the Pan bazar to the Shapergana school in ward no -05.
- One guide wall should be constructed in ward no 06 surrounding the road from the Jarulbunia station to the Jarulbunia Central Mosque.
- Renovation of the Shah Kijiria road which is located in ward no -02.
- One sluice gate should be constructed in the Chaptamora canal for proper drainage of water and the embankment situated in this area should be renovated.

- Approach ramps should be constructed for bridges. It should be noted that there are many bridges which do not have a connecting approach road. Attention should be given to this issue.

***Agricultural Sector:***

- Production of short duration rice varieties.
- Production of flood tolerant rice varieties.

***Physical Structure:***

- Illegal constructions should be removed from riverside and canal side areas. The canals should be free from illegal encroachment. These constructions block the natural flow of rivers and canals, creating floods and flash floods.
- Rubber dams should be renovated in the respective areas of the Shilkhali union and Cox bazar.
- If possible, the constructions of the hill areas (ward no-1, 3) which are in risk zones for landslides should be relocated to safer places.

***Other Sectors:***

- Access to first aid facilities should be made obligatory in every school.
- Illegal hill-cutting should be banned.

## 4.2 Risk Reduction Action Plan:

The risk reduction action plan was developed by analyzing and comparing the data collected from the field during the CRA process. This action plan is the accumulated result of community input through active participation during field study. Key informants, like CPP volunteers, the UP secretary and agriculture officer; were interviewed to figure out the existing problems, opinions about how to reduce risks and the field facilitators' perceptions of the union and the analysis conducted by the CRA consultants.

Table 7: Risk Reduction Action Plan

| **Serial** | **Risk Reduction options** | **Done by whom** | **When will be it done?** | **How will it be done?** | **Where will it be done?** | **Probable Cost** | **Things to be considered for implementation** |
|---|---|---|---|---|---|---|---|
| 1 | Dredging of the local canals | SKS, UP, LGED and non-government organizations such as Brac and ASA | October 2019-May 2020 | Making a volunteer team, with the help of UP | *Bhola Khal, Jarulbuniya Khal* and different sized *chhoras* situated in the union | | Community people might be available as laborers if offered decent wages. |
| 2 | Road reconstruction and renovation | SKS, UP, LGED and non-government organizations such as Brac and ASA | October 2019-May 2020 | Making a volunteer team, with the help of UP | In different wards of the whole union mostly ward no 2, 3, 5, 6, 7, 9. | | Available soil and labor |

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| 3 | Tree plantation | Forest department, UP, SKS, community people and non-government organizations such as Brac and ASA | As soon as possible | Village Development Committee; making a volunteer team, with the help of UP and community people | Dams and on the banks of canals | | Available community people can be utilized through raising awareness. |
| 4 | Renovation and reconstruction of bridges and culverts | SKS, UP, LGED and non-government organizations such as Brac and ASA | October 2019-May 2020 | Making a volunteer team, with the help of UP | In different wards- 2, 3, 4, 5, 6, 8 | | Community people would be available as laborers. |
| 5 | Ensure production of short-term rice production variety | Agriculture officer, UP, SKS and non-government organizations such as Brac and ASA | October 2019-February 2020 | Making a volunteer team, with the help of UP | In different wards- 1, 2, 4, 8, 9 | | Ensuring all deprived people to be aided |
| 6 | Guide wall construction for different roads and canal sides | LGED, LGRD, SKS, UP and non-government organizations | October 2019-May 2020 | Village Development Committee; making a volunteer team, with the help of | By the roads in different wards, near cluster villages | | Available local soil and labor |

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| | | such as Brac and ASA | | UP and community people | | | |
| 7 | Ensure seed distribution of flood tolerant rice variety | Agriculture officer, UP, local experienced people and non-government organizations such as Brac and ASA | October 2019-February 2020 | Village Development Committee; making a volunteer team, with the help of UP | In different wards of the whole union | | Ensuring all deprived people to be aided |
| 8 | Eradication of illegal construction from the canal | LGRD, UP, community people and non-government organizations such as Brac and ASA | As soon as possible | Village Development Committee, with the help of local government and community people | Above Bhola Khal, *Jarulbuniya* and *Matamuhuri fari* canal | | Using local human resources through raising awareness, relocation of residents of illegal constructions |
| 9 | Taking steps to stop illegal hill cutting | Forest department, UP, community people and non-government | As soon as possible | Village Development Committee, with the help of local government and | In different wards like 1, 2, 5, 6, 9 | | Using local human resources through raising awareness, alternative livelihood and habitat options |

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|---|---|---|---|---|---|---|---|
| | | organizations such as Brac and ASA | | community people | | | for community living in hilly areas |
| 10 | Ensure first aid facility for any emergency situations in every educational institute | UP, BFSCD, SKS and different non-government organizations | As soon as possible | Surveying with the help of Village Development Committee and making volunteer team | Educational institutes in different wards | | Selection by ward wise surveying |
| 11 | Renovation of rubber dam | SKS, UP, LGRD and non-government organizations such as Brac and ASA | October 2019-May 2020 | Making a volunteer team, with the help of UP and community people | In ward no 2 mostly | | Using available local labor through raising awareness |
| 12 | Ensuring approach ramp for every bridge | SKS, LGED, UP and non-government organizations such as Brac and ASA | October 2019-May 2020 | Making a volunteer team, with the help of UP | Bridges and culverts situated in different wards- 2, 3, 4, 5, 6, 8 | | Community people can be employed as labor, available local soil |
| 13 | Lifting the houses on higher lands | SKS, UP, Department of Social Services, LGRD and non-government | October 2019-May 2020 | Selection of houses with the help of VDC (Village Development Committee), | In different wards- 2, 3, 5, 8, 9 | | Available soil and labor |

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|---|---|---|---|---|---|---|---|
| | | organizations such as Brac and ASA | | with the help of VDC and UP | | | |

# Chapter -05: Conclusion

Due to its geographical location, the Shilkhali union is threatened by many hazard events. The Community Risk Assessment helps give a clear idea about the local risks, hazards, vulnerabilities, exposure and sensitivities from the perspective of local people, along with that of the researchers. Local people's adaptive capacities are also represented with the help of CRA. As the information collected is concerned not only with local people but also with the union's authorities and administration, it identifies multiple perspectives of exposure and sensitivity reduction, helps develops plausible risk reduction options and finally supports the creation of action plans in accordance with those risk reduction options. For the betterment of the local socio-economic condition, there should be a bottom-up approach. Raising awareness among the community people will be helpful in many aspects. For any projects to run, there should be a collaboration between the local community and the concerning authority. Accountability and transparency should be ensured in all aspects of all sectors in the implementation process. New technologies and more initiatives should be introduced with the cooperation of local people.

The Shilkhali union incorporates many promising sectors, such as vegetable cultivation, poultry, fishery: all the necessities for recognition by different leading NGOs, INGOs and GoB. Proper investment can make the union more economically stable and independent. A follow up training facility is recommended for the development of local human resources.

# Bibliography


Bangladesh National Portal. (2019a, November). *এক নজরে পেকুয়া উপজেলা.* Retrieved from http://pekua.coxsbazar.gov.bd/site/page/8ce08e11-2144-11e7-8f57-286ed488c766/%E0%A6%8F%E0%A6%95%20%E0%A6%A8%E0%A6%9C%E0%A6%B0%E0%A7%87%20%E0%A6%AA%E0%A7%87%E0%A6%95%E0%A7%81%E0%A7%9F%E0%A6%BE

Bangladesh National Portal. (2019b, November 13). *পেকুয়া উপজেলার পটভূমি.* Retrieved from Pekua Upazila: http://pekua.coxsbazar.gov.bd/

Banglapedia. (2015, April). *Pekua Upazila - Banglapedia*. Retrieved from http://en.banglapedia.org/index.php?title=Pekua_Upazila

BBS. (November 2011). *Bangladesh Population and Housing Census 2011; Community Report; Zila: Cox's Bazar*. Ministry of Planning. Bangladesh Bureau of Statistics.

Comprehensive Disaster Management Programme (CDMP). (2006). *A FACILITATORS GUIDEBOOK FOR COMMUNITY RISK ASSESSMENT AND RISK REDUCTION ACTION PLAN*.

UNDRR. (2019) *Poverty and inequality*. https://www.preventionweb.net/risk/poverty-inequality

Wikipedia. (2019a, November). *Socioeconomic status*. Retrieved from https://en.wikipedia.org/wiki/Socioeconomic_status

Wikipedia. (2019b, November). *Cox's Bazar - Wikipedia*. Retrieved from Wikipedia: https://en.wikipedia.org/wiki/Cox%27s_Bazar

# ANNEX- I

FGD checklist: The Focus Group Discussion was conducted on 22 September, 2019. FGD consisted of groups of 8 to 10 people.

| FGD No | Community | Location | Ward No |
|---|---|---|---|
| 1 | Betel-leaf farmers | Jarulbuniya Station | 5 |
| 2 | Minor Community (Hindus) | Shilpara, Napitpara, Kacharimora | 1 |
| 3 | Farmers | Alekdiya para | 2/3 |
| 4 | Different occupational people | Majherghona | 7 |
| 5 | People occupied in different services | Pan bazar | 5/6 |
| 6 | Women Community | Member's house | 9 |
| 7 | Unprivileged people group | Petanmatbor para | 9 |
| 8 | Market/shop owners | Dokan para | 4 |
| 9 | Hatchery and fishery owner/labor community | Miyajan para | 4 |

KII Checklist: The Key Informant Interview was conducted on 23 September, 2019.

| KII No | Name | Designation |
|---|---|---|
| 1 | Md. Bakhtiar Uddin | Head teacher, Jarulbuniya High School, Shilkhali |
| 2 | Monirul Islam | CPP team leader, Shilkhali |

| | | |
|---|---|---|
| 3 | Saleha Begum Putul | Representative, EKLAB Project |
| 4 | Amirullah Shikder | Assistant Agriculture Officer, Shilkhali |
| 5 | Ramjan Ali | Member, Village Police, Shilkhali |
| 6 | Md. Al-Amin | Secretary, Union Parishad, Shilkhali |

## Schedule of Maps 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 | Wed 10-09-19 | Wed 10-09-19 | 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 |

## ANNEX-II

Photo Gallery: The photos are taken throughout the CRA process conducted from 21 September, 2019 to 26 September, 2019.

Figure 1: Highly sedimented Jarul bunia canal situated between wards no 4 and 7

Figure 2: Shilkhali Kasemul Ulum Madrasa and Orphanage (Madrasa building-left, Mosque building-right), highly at risk of cyclones and flash floods

Figure 3: Hajirghona para of ward no 8 cluster village (prone to flooding around 4/5 feet water height)

Figure 4: Hajirghona HBB (Herring Bone Bond) road (prone to flooding)

Figure 5: Petan Matbor Para Govt. Primary school road, 1.5 km flat soling and HBB (Herring Bone Bond) in ward no 9 (prone to flooding)

Figure 6: Petan Matbor Para Govt. Primary School in ward no 9 (prone to flash floods, floods and waterlogging)

Figure 7: Tarabunia Para side road, in ward no 9 (prone to floods and flash floods)

Figure 8: Shobuj para School Road, 400 feet, in ward no 7, HBB (Herring Bone Bond) road (prone to flooding)

Figure 9: Dokan Para to Shobuj Para 1km HBB (Herring Bone Bond) road in ward no 7 (left); the *shako* situated in the western side of Hedayetabadi in ward no 2 (right)

Figure 10: Shilkhali to Pekua connecting *Shakoo* in ward no 2 by southern side of Shilkhali High School (left), Dalar Mukher Culvert in ward no 6 (right)

Figure 11: road in ward no 1

Figure 12: Flat soiling road from Kasarimora school to Main road, in ward no 1

Figure 13: Key Informant Interview of CBO representative (left) and Principle (right)

Figure 14: conducting Focus Group Discussion (left) and Union Parishad Workshop (right)