Impacts of periodic floods in River Islands of North-West Bangladesh: Background and Research Questions*

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Introduction:

Bangladesh is amongst the most densely populated countries in the world where chronic poverty is widespread and acute. Poor people are found in both rural and urban areas, throughout the country. Particularly dense pockets of ultra-poor (or extreme poor) could be found in many river island areas mainly in the North West part of Bangladesh. River islands, which are locally known as "Char'', are areas of land that regularly form sediments and are eroded by major rivers of Bangladesh. Moreover, seasonal as well as occasional major floods cause regular sufferings for the people living there. These islands are just a few inches above normal river water level and are extremely vulnerable to flooding during the wet season as monsoon precipitation usually swells the river together with glacier melt of the Himalayas. Floods frequently result in loss of economic activity, possessions and homes disrupting families, livelihoods and earnings. Erosion of large Char areas due to floods is typical and not limited to Northern Bangladesh. In every year, some of Char population is forced to evacuate to mainland to look for shelters after the flood. Therefore, living in Char is highly precarious, risky and dangerous in times.

Char islands are generally sandy and infertile, especially in the northerly Chars. In addition, the land ownership of Char lands is complex and complicated. Though most Char lands are de jure state owned, in reality most land has a de facto claimant who is economically and politically powerful and acts as a "Feudal Lord" to the people living on the Char, in the sense that they are at times beyond the reach of judiciary (Barkat *at.el* 2007). In most cases the poor get the right to live in the char in exchange of their labor to serve the feudal lords. On occasions where poor families gain the access to a piece of land for cultivation, it is mostly done based on sharecropping or leasing arrangements. However, due to the infertility of the sandy soil, most of the popular crops such as paddy are difficult to produce in Char lands. As a result, majority of the char island people are believed to be in extreme poverty for generations.

Transportation and communication with Char islands from the mainland are also major impediments to development. Major mode of transportation with Char islands is the boat which is infrequent, time consuming and vulnerable with bad

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weather condition. Furthermore, government provided basic services like health and education is inadequate in Char lands. Health services are almost non-existent in Chars except for those run by the humanitarian agencies. Under-nutrition is also widespread on the Chars and is caused by inadequate diet, poor sanitation, and lack of knowledge on hygiene. Primary schools in Char islands are rare, and where schools are run, they are under poor management and severe teachers' absenteeism problem (Marks and Vignon 2008). Local government administrative departments are in dearth with hardly any presence of law enforcement authority and protection against crime and robbery. Supply of electricity is also limited with hardly any char land has been properly been electrified by Rural Electrification Board of Bangladesh. The illiteracy rates among adults on the Chars are high with almost nine out of ten household heads have received no formal education at all (Scott 2008). Even microfinance services are rare on the chars despite the fact that Bangladesh has widespread network of micro-finance institutions.

According to the statistics of the DFID funded recent initiative of Char Livelihood Program (CLP) the population of the Chars in which CLP works is approximately 800,000 representing some 175,000 households. A third of them have been identified as extreme poor, surviving on less than 60 Taka (1 dollar) per household per day with no asset, no land and no secure income source. The majority of Char dwellers are poor or extremely poor people who have no other place to live. Many of the people living in the Char have been forced out of their previous homes by floods, erosion, debts and insecurity. Moreover, labor markets in Chars are also restricted with limited diversification in off-farm sectors. Most Char households are reliant on daily wage employment, share cropping and share rearing of livestock's for survival.

Char households are sensitive to seasonal unemployment and are considered the most food insecure in Bangladesh (WFP 2002). After the planting of Aman paddy, farmers face seasonal unemployment from September to November which is locally known as "Monga". Monga can be prolonged and intensified due to the near annual preceding of floods and monsoon. Although anticipated, such seasonal unemployment has the most significant impact on the poorest households in the community, who in times, take various desperate coping strategies for survival. Household coping strategies employed are often trade-offs between short-term subsistence and longer-term economic goals and can include the distress sale of income generating assets, significant reduction in consumption, advance sales of labor and borrowing money from the landlords or loan-sharks at high interest rates (Shonchoy 2011).

Periodic Flood scenario in Bangladesh:

Usually, Bangladesh faces two types of river-based floods: high frequency but localized floods that are considered normal and are identified with the monsoon season itself; and low frequency floods of extreme nature (Rasid and Paul, 1987; Rogers et al, 1989; Boyce, 1990). These two types of flood are identified as 'normal' and 'extreme' floods respectively.

One of the most common natural calamities that affect Char dwellers quite regularly is the periodic "normal" flood due to the monsoon led heavy rainfall during the period of Rainy season (typically early July to late September) in the up-stream areas of river origins in India and Nepal (Marks and Islam 2007). For instance, Marks and Islam in their paper reported a major periodic flood in 2007 that have overflown the major river system of Northern Bangladesh and has affected 2/3rd of the entire nation.[1]

After the 2007 flood, the next major periodic flood happened in the Northern part of Bangladesh in during the time of our survey in 2012 (Kenward, Cordier and Islam 2012) which lasted for almost for three weeks before the water level reached to a normal operation level (see Annex in page 10 for flood affected areas in 2012). According to statistics from the Bangladesh Government's Disaster Relief and Rehabilitation Office (DRRO) dated 7 July, a total of 1,029,695 families had already been affected in 74 upazilas (i.e. sub-districts) of 10 districts at that stage.[2] To put the statistics into perspective, in our survey areas of Kurigram and Gaibandha, a total of 123,806 and 66,015 families were physically affected respectively, with a combined total of fully damaged household number at that stage was 32,858 with a death toll of 7 people (Source: D form of Damage Statistics at Government District Relief & Rehabilitation Office (DRRO), as of 19 July 2012).

Impact of Flood on Char

There is an extensive body of literature analyzing the impact of flood on Bangladesh on agricultural production (for example see Hossain et al, 1988) and wages (for example see Banerjee 2007). However, there is only a handful study, mostly anecdotal, exists on the impact of flood on the river island dwellers. Ahmad and Khondker (2010) paper reveals that seasonal food insecurity in the Char areas is even

[1] See the BBC report http://news.bbc.co.uk/2/hi/south_asia/6929004.stm

[2] Disaster Management Information Centre (DMIC) has been regularly updating the situation reports since 2 July when the flooding occurred in 2012. See the following link http://www.cdmp.org.bd/modules.php?name=Situation.

more severe than other Northern parts of Bangladesh. Analyzing household level data collected from a 64-village census plus survey, Shahabuddin and Ali (2006) concludes that flood-prone zones, especially island Chars, are the worst off among different disaster-prone areas in terms of food shortages, the incidence of extreme poor, insufficient income, illiteracy, and a high concentration of wage labourers. These Char dwellers vulnerability is further worsened by their inability to reduce the risk of natural disasters as that do not have any viable coping strategies other than borrowing and savings.

Impacts of periodic flood on the Char dwellers are systematically different than from the dwellers of inlands due to many reasons and it could be classified with immediate and long-term impacts. Let us focus on these various issues in the following subsections:

Immediate Impact:

Loss of Economic Activity: Char is the most vulnerable to flood and the periodic rising level of river water than inlands, causing frequent evacuation for the dwellers to nearby flood shelters. However, not all the Chars has well established flood shelter at near-by places and it was found in various reports in the newspaper that flood-affected people of Northern Bangladesh took quick shelter at the local government offices, schools and even on the embankments.[3] Moreover, in 2012 during the time of our survey, four episodes of flash flood affected the survey area in June, July, August and September which has caused regular relocation to nearby shelters. This force dislocation and evacuation for uncertain period of time is linked with considerable loss of economic activity by disrupting livelihoods and earnings. Moreover these unplanned relocations also cost extra financial burden on the families in the form of migration cost (for example boat fare, accommodation expenses, etc.) as well as mental cost (for example increased insecurity) and social cost (loosing social ties with friends and neighbors, for example).

Health impact: Periodic flood also has significant negative impacts on health condition especially on the children. During the monsoon season average seasonal temperature, precipitation and humidity is favorable in increasing the incidence of water-borne (and air-borne) diseases. It is well known that bacteria, parasites, and their vectors breed faster and survive longer in warmer, wetter conditions which are the typical condition during the monsoon season in Bangladesh, although the climate alone is not a

[3] See http://www.thedailystar.net/newDesign/news-details.php?nid=238912

sufficient condition for these diseases. Moreover, rainfall facilitates breeding of mosquitoes and migrants from infected areas could act as a facilitator for its resurgence on the Chars. The source of pure and clean drinking water is also a significant concern.

Sanitation issues: Open defection is widely used on the Char areas and is a major source of diseases. Though several aid agencies (for example UKAID) with active collaboration with local NGOs and Government offices tried their best to improve the scenario of safe sanitation practice in the Char region, however, the fact remains the same. The situation gets even worse during the time of the flood as most of the improved sanitary latrines provided by aid support go under water. Poor sanitation facilities during the time of flood as well as limited sanitation facilities in the flood-shelters easily spread the Diarrheal diseases (like cholera) and increase the risks of water-borne illness.

The story is different with the condition of drinking water. Typically hand driven tube well is the main source of drinking water in the Char. However, during the time of flood, a large number of hand driven tube-wells have been contaminated by flood waters and were sub-merged which has forced the affected population to seek alternative unsafe water sources (from nearby pond or river, for example) for drinking, daily uses and for cooking. This has caused water-borne diseases to spread like en epidemic and many people especially children from affected areas were found to have chronic illness like dysentery, skin diseases, etc.

Food insecurity: As one can easily imagine, one of the immediate impact of flood is the loss of food stocks which are very severe loss for the poor households. Usually during the time of quick relocation, it is very difficult for Char dwellers to carry their food stocks with them or to keep the stock in a secure and safe place not to be damaged by flood waters. Hence flood affected families face the consequence of food insecurity lack of adequate nutrition, and get fully dependent on relief support. While government allocated some rice to the affected population to assist with immediate food needs, however, neither the quantities provided were not consistent with the standards or the needs of the affected population, nor could it provide sufficient nutrition to the affected families. Furthermore, flood shelters have inadequate facilities for cooking rice on a daily basis and the need for alternative food supplements grows leaps and bounds, especially for the children. At that time many families skip meals and hoard the relief food for future consumption.

Loss of valuables: Typically the houses available in Char are made with straw, bamboo and tin. As a result during the time of sub-merged period, flood-affected households either completely or partially suffer with physical damage of their households. Moreover, loss and sickness of valuable livestock and poultry is also a very common phenomenon during the flood-time for Char dwellers. Other reported damages are household non-durables, crop-seeds, homestead gardens and savings of petty cash at the household level.

Long term Consequences:

Erosion: One of the most devastating aftermaths of periodic flood is the river-erosion and soil erosion. In both circumstances Char-dwellers suffer from loss of valuable lands and assets and forced to relocate to a new char. This also requires a significant cost for the char dwellers for rebuilding new houses, re-location cost and other social and psychological costs. In our survey, we have not found any household in the sample who has never been forcefully relocated due to soil erosion from the past chars of their residences. The number of forced relocation could go up to a staggering 25 times for one's lifetime which shows the degree of vulnerability a typical char dweller face by residing there.

Loss of crop: Frequent loss of crop due to prolonged flood is another regular phenomenon for the char dwellers. The typical occurrence of periodic flood damages cash crops for the poor agricultural workers partially if not completely every year. For instance, during the current flood in 2012, our survey household reported the major loss cash crop like Maize, Chili, Onion and Oil seeds. The late occurrence of periodic flood in our survey areas also damaged the early seed bed of Aman paddy for transplantation.

Debt and Credit problem: Char dwellers in most cases are routinely indebted to the landlords for borrowing money with high interest rates or in exchange of labor during the time of flood and Monga, which can be considered as prolonged lean season that creates a poverty trap for the Char dwellers. Usually after the water recedes, Char dwellers would like to take the advantage of deposit fertile silt on the floodplains which significantly reduces the cost of farming. As a consequence, farmers typically lend money on a very high interest from the land-lords or loan sharks to restart cultivation. This lending is coupled with the money lent to cover household living

expenses until the next harvest as well as pawning and sell of valuable assets.

Investment: Due to frequent erosion of soil and assets due to periodic floods, Char dwellers are expected to be discouraged to invest in assets of long maturity. This means that they tend to avoid investments on land improvements, irrigation, farm machinery and equipment's, and children's health and education.

Migration: Periodic floods have significant negative impact on migration. Channels under which floods may hamper the migration process could be two fold. Flood deprives chances to accumulate assets and leads to chronic poverty and liquidity constraints which hinder people to migrate to other areas for better income. Also frequent and prolonged flood deprives Char dwellers to build networks for temporary seasonal migration.

Research Methodology

To the best of our knowledge, no systematic evaluation has yet been conducted in Bangladesh using household level data to estimate the extent of impact of flood on Char dwellers. In our study, we will tackle mainly three issues with the flood by taking the advantage of the exogenous variation of flood affected Chars in the Northern Bangladesh.

Firstly, to estimate the flood risk measures we will create a time series data of flood damage based on the historical data for each *Char*. Our first source of information for this would be from the local government, if any. Then we will use local knowledge of the dwellers as well as the knowledge of NGOs and Humanitarian agencies to create this information.

Secondly, to get the flood turnovers data of residents, we will ask and compare turnovers with recall data and then relate these data with flood risks information.

Finally and most importantly, we will measure the impacts of flood. For this we can use the meteorological/geographical data of the government to get the river water variation and elevation of individual Chars to identify the flood affected Chars and estimates the impact of flood on those Char dwellers. Other than economic impact we would also like to estimate other impact of flood on Char dwellers, such as impact of flood on health, migration and network building. Other non-traditional impact of flood could be on the occupational diversification and various coping strategies and the determinants of such coping strategies among the dwellers.

To account for the unobserved and cluster fixed effects, we employ a Panel survey for this study. As a result, we will first run a complete baseline survey in the month before the monsoon. This baseline survey will have detail information on household roasters, income, health, wealth, occupation, education, marriage and previous migration related information. We will also collect detailed health and disaster related information of the char dwellers.

The follow up survey on this project is going to be implemented in the year after the baseline survey has been completed. This follow-up survey will help us to create the panel data with the information of flood, health, relocation, and migration. This follow-up survey will be funded under the next project to me proposed to IDE in the next fiscal year.

Research Questions:

This study can shed some light is on

a) Various coping strategies by the char dwellers to tackle such periodic disaster.
b) Understand the effectiveness and appropriateness of coping strategies in situations like periodic floods in Bangladesh; and
c) Impact of flood on char dwellers.

The purposes of study are:

- Impacts of seasonal flood on the poor living in Jamuna River basin.
- Impacts of entrepreneurship on micro-credit uptake and outcomes.
- Impacts of waiting period/convex investments on micro-credit uptake and outcomes.

To do so, subsequently in the follow up study, we will contrast the difference in the above between the moderately poor and the extreme poor. This contrast will provide how the above impacts differ among the different wealth classes.

Sample frame:

Char-villages: Given our focus on chars, we mainly concentrated on island chars. In fact, there are several types of chars[4], namely island, peninsula, and bridged. Island chars are completely detached from banks of river. Peninsula chars are divided by small, peditable streams or even connected to the banks in the season of low water

[4] This classification is used by the Char Livelihood Program of DFID, not an offi cial classification recognized by the Government of Bangladesh

levels. Bridged chars are a type of island chars lying next to the bank and are connected by an earthen passage. It is only the island chars that require boat rides, yet other char types may experience isolation from the banks in the flood seasons.

The chars are, by nature, not stable in its size and even its existence. Due to soft silt sand soil, it is easily washed away by the water. So the classification of chars is somewhat ad hoc and is loosely used in our text only for the purpose of simplicity. Nonetheless, most of the chars are not expected to vanish in our study period of four years and our use of chars as a cluster unit in our sampling process is justifiable.

We have used Landsat images (see Annex 3) to identify the chars. Given that chars are not stable, we needed to use the most recent images of April, 2012. By visual inspection, we counted the number of chars over the image and inspected all the chars by field visits. Annex 3 shows the number of points on chars where GPS coordinates were measured to have rough locational information of each char. Upon visit, GUK local staffs identified the name of the chars and existence of villages on the char. They have provided us with a list of all villages over the points shown in the image.

In selecting villages on chars, we collected information on the other NGOs program coverage. We made sure that we will choose the villages without any micro-finance activities by other micro-finance Institutes (MFIs). It turned out that it is not difficult to find chars without any micro-finance services. This follows as most of the micro-finance institutions, either for profit or non profit, targeted the client-base mostly on the mainland or in the river banks. Some selected chars and villages have NGO activities mostly in the non-finance field, such as education or health programs, so one need to control for its presence when we estimate the indirect impacts of the program on the social indicators. However, particular attention has been given to select villages which are not under any CLP intervention.

Household selection: We have selected the households for survey in two steps. In the first step, we listed all households and ranked them in their wealth levels to classify into ultra and moderately poor. In the second step, we stratified our population into these two (plus wealthy) poverty classes and randomly selected 20 households for our survey. It is important to note that we randomized the eligibility for survey at the household level, not at the village level. So in each village, all ultra and moderately poor households have a chance of becoming interviewed by our enumerators. This helps us in estimation to increase the statistical power at the given sample size.

Figure 1: PRA Process

In the first household selection, there were possible choices, random walking, CLP census household list, and participatory rural appraisal (PRA). Random walking resembles convenience sampling, and is not suitable for serious random sampling. CLP census household list could have been the best option, however, the geographical scope of CLP is different and there was little overlap. Thus we chose to conduct visual inspection using satellite image, carried out char census, and then used PRA to compile household lists and their wealth rankings.

In the second household selection, we used the wealth level to be the criteria to assign eligibility of program participation. We stratified the population into wealthy (which we excluded from our sample), moderate poor, and extreme (ultra) poor. The working definition of the ultra poor we use generally follows the algorithm developed by CLP. The necessary conditions for participants are the following CLP (2012):

- Have been living for at least 6 months on island char.
- Have no ownership or access to land.
- Have productive assets worth not more than Tk 5,000.
- Must not own more than two goats/sheep, or ten fowl or one shared cow.
- Not be receiving cash/asset grants from another programme.
- Have no regular source of income.
- Be willing to attend weekly group meetings for 18 months.

However, the criterion used by GUK to detect Ultra-poor is the following

1. Women headed household without regular income and/or Household that's is totally dependent on others e.g. casual/day labor, beggar, house wife, maidservant,
2. Chronic food insecure, i.e. members of the households who often skip meals due to insufficient food.
3. Families whose monthly gross income not more than Tk. 2,000'00 (including own productions and income from other sources) for a five members family.
4. Household owning no land or sheltered on embankment or other place.
5. Household with at least one family member suffering from malnutrition.
6. Household having family member(s) with disability and/or illness. Households with a man who cannot generate an income due to a disability or illness will be included when the women are the main income provider (hh is women headed).
7. Government Safety net supported people (i.e VGD/VGF cardholders, elderly), are not necessarily excluded, as the support they get is minimal.
8. Housing conditions (material and water and sanitation facilities) of household are very poor.

In identifying ultra-poverty, we do not implement the following exclusion criteria as a BRAC document (BRAC 2009) suggests:

- The household is dependent upon female (domestic) work, for example, begging.
- No active, adult male members in the household.

Following CLP, we used the following participatory poverty mapping process (known as participatory rural appraisal or PRA) in identifying the ultra poor:

1. IDE specifies the area in which interventions will be carried out.
2. (1st placement selection) IDE selects villages and GUK sends staffs for ice breaking sessions.
3. GUK announces village meetings a few days prior to the meetings. More number of meetings will be held for bigger villages. Participation to village meetings is voluntary, but the participation rates are generally high.
4. Through the Participatory Rural Appraisal (PRA) approach, GUK and villagers create a household census list, and draw a social map of the village and classify households into ultra poor, moderately poor, and rich.
5. GUK conducts a census on households listed on the list. They ask about names

of household head and spouse, land and asset holding. It usually takes 5-6 days before drawing a map and identifies the target population.

6. GUK conducts a door-to-door surveillance for the ultra poor households to verify the asset information.
7. After verification of asset information, GUK finalizes the list of households that are deemed to be ultra poor. Then they form groups of 20-25 ultra poor households.
8. (peer selection) GUK holds a village meeting, and ask who should be given priority in receiving cows (as an asset), in the order of asses the depth of poverty. In their previous programs, there are about 5 to 7 cows per village.

As can be seen, GUK's method of selecting the ultra poor households involves peer selection. It is difficult to assess how the selection was made. There may be some element of local capture by the elites because cows are believed to be a profitable investment vehicle among the villagers. However, unlike CLP or BRAC programs, the GUK program does not give away any assets. They consciously choose to lease out the assets (or equivalent cash in the areas outside our study area) in an effort to make the program self-sustaining. We also instructed GUK not to subsidize any inputs supplied through them. Given the downside risks involved in becoming a cow lessee after becoming a group member, it is not necessarily the case that the elites would want to be a member by fabricating their asset holding in front of the public eyes. It would also imply that there may be advantageous selection that more able individuals would self-select themselves into the program.

So one needs to understand our subject population as selected through self-selection criteria, similar to any microfinance program, except that they are ultra poor in the sense we defined in the above. The self-selection process arguably clouds the characteristics of the population. However, this is more of a necessary evil because one cannot provide a lease had they not wished to receive one.

As noted, we have included not just the ultra poor but also the moderately poor to see the differential impacts of the program. A larger weight on the ultra poor is given than the moderately poor, with the ratio of 7 to 3. After listing all households of ultra and moderately poor, we have randomly chosen 20 members in a village, 14 ultra poor and 6 moderately poor, to become members of the program. If there is any rejection by the households, we further extended the invitation to other households in respective wealth class to reach 14 and 6 sample size in a village.

Logistically, the following procedure was implemented. After listing up all

households, GUK sends a sequence of household IDs to IDE. IDE randomly splits the sequence into two sequences, and re-arrange the order of each sequence randomly. These two, mutually exclusive ordered sequences of household IDs were sent back to GUK. Using the first sequence, GUK is instructed to give offer of eligibility of membership to households of respective wealth class, and if the household accepts the membership, the household is offered a formal membership. If the household rejects, or GUK finds the designated household member not eligible based on the criterion set above, another household is drawn from the ordered-sequence to be offered a membership. This process is repeated until the target sample size is secured. All the information on rejection is saved as data.

After this process, we performed a detailed base-line questionnaire to understand the socio-economic condition of the char dwellers along with their flood affect information. In doing so, we have asked questions on household and personal characteristics, details of land holding and leasing, durable and non-durable asset information, debt, savings and credit information. We have also designed a set of questions on their re-location history and migration information. In the flood related questions, we asked about their coping strategy, total as well as categorized list of damage and forced migration information. Details of the survey question are added at the end of this report for reference.

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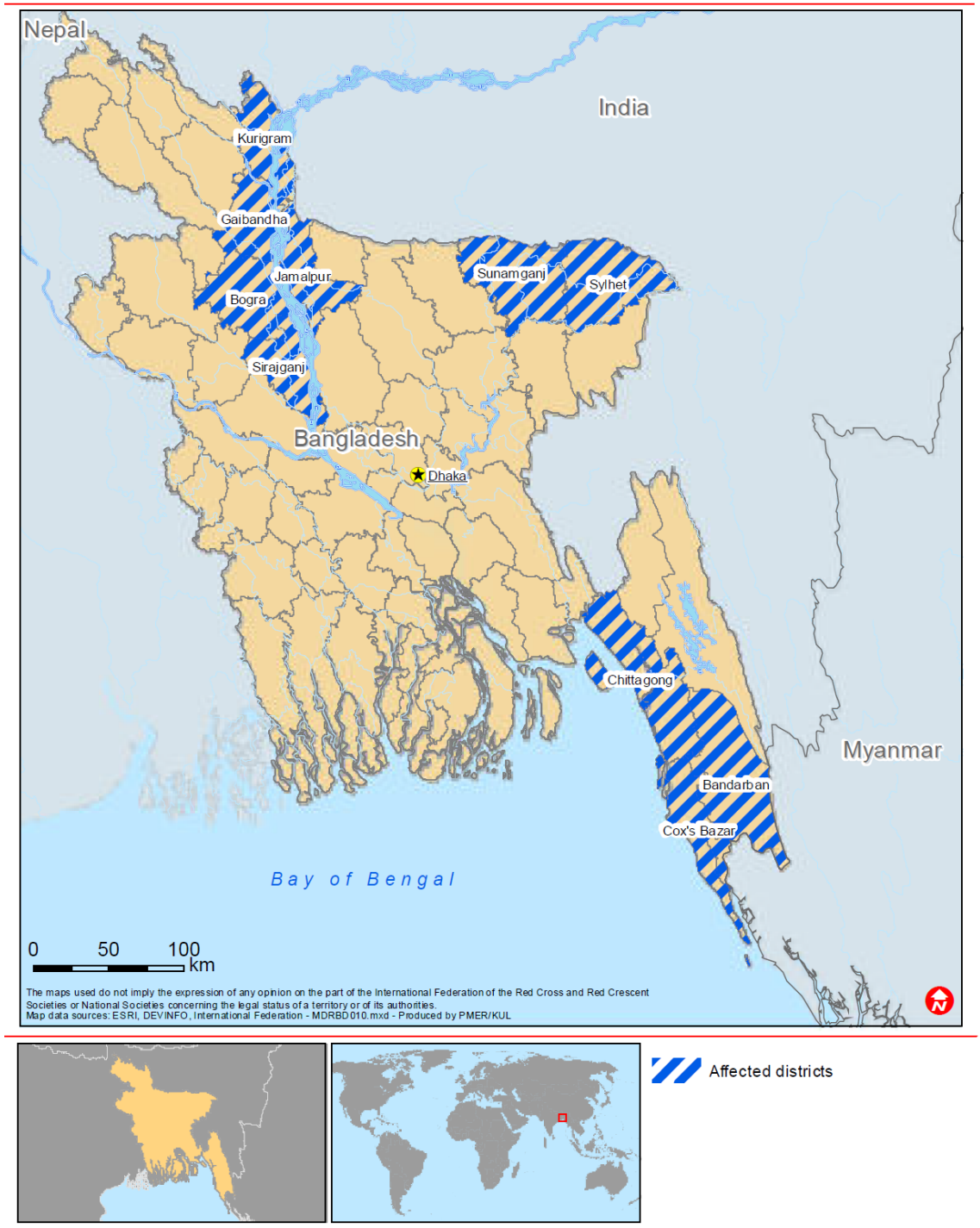
ANNEX 1

Bangladesh: Floods and Landslides



Source: Bangladesh Red Crescent Disaster Bulletin

Annex 2:

Satellite Image of Chars

Note: Blue points indicate the points where GPS coordinates were measured