

# ***Socio-Economic Impact of Climatic Change in Coastal area- A Case Study of High tide and Flood in Charipara Village of Patuakhali District***

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## ***Abstract***

*The climate in Bangladesh is changing and it is becoming more unpredictable every year. The impacts of higher temperatures, more variable precipitation, more extreme weather events, and sea level rise are already felt in Bangladesh and will continue to intensify. Climate change poses now-a-days severe threat mostly in agricultural sector and food security among all other affected sectors. The effects of flood are manifold in Bangladesh since flood water remains long time onto the land. For example, all means of communication viz. roads, railways, highways, and even runways become paralyzed due to flooding. It causes widespread damage to crops, stored food grains, domestic animals, homesteads, development infrastructures, and human lives. People remain maroon in water without having food and drinking water until relief arrives. The consequences of such recurring floods are really well beyond the capacity of a developing country like Bangladesh to bear. This paper contributes to know the most effecting socio economic impact of tidal flood as a change in climate in the most vulnerable coastal area.*

## **Background of the study**

Climate change is undeniable and unequivocal. Bangladesh, a low-lying coastal area in the middle of the heavily populated mega-delta of the Ganges-Brahmaputra plain, is widely recognized as one of the most vulnerable countries to climate change. Combined with a high frequency of natural disasters, like floods, droughts and cyclones, a weak economy and high poverty levels, it makes Bangladesh a hotspot for climate change vulnerability (Nicholls et.al. 2007;317 and 337 and Parry et.al. 2007;859). Bangladeshis have a long record of adapting to changing weather and climate, as well as a variety of natural hazards, but climate change might also pose new challenges outside the scope of experience (Adger et.al. 2007;719 and Christoplos et.al. 2009;2). It is necessary to understand climate change problems, responses and capacities from below; from the perspective of farmers, fishermen and workers living with climate changes in rural Bangladesh. Their perceptions of climate change influence their choices in relation to adaptation strategies, due to the fact that people respond to perceived risks, and not the risks the researcher or others think are important. One critical variable that determines the vulnerability of Bangladesh to climate change impacts is the magnitude of tidal flood.

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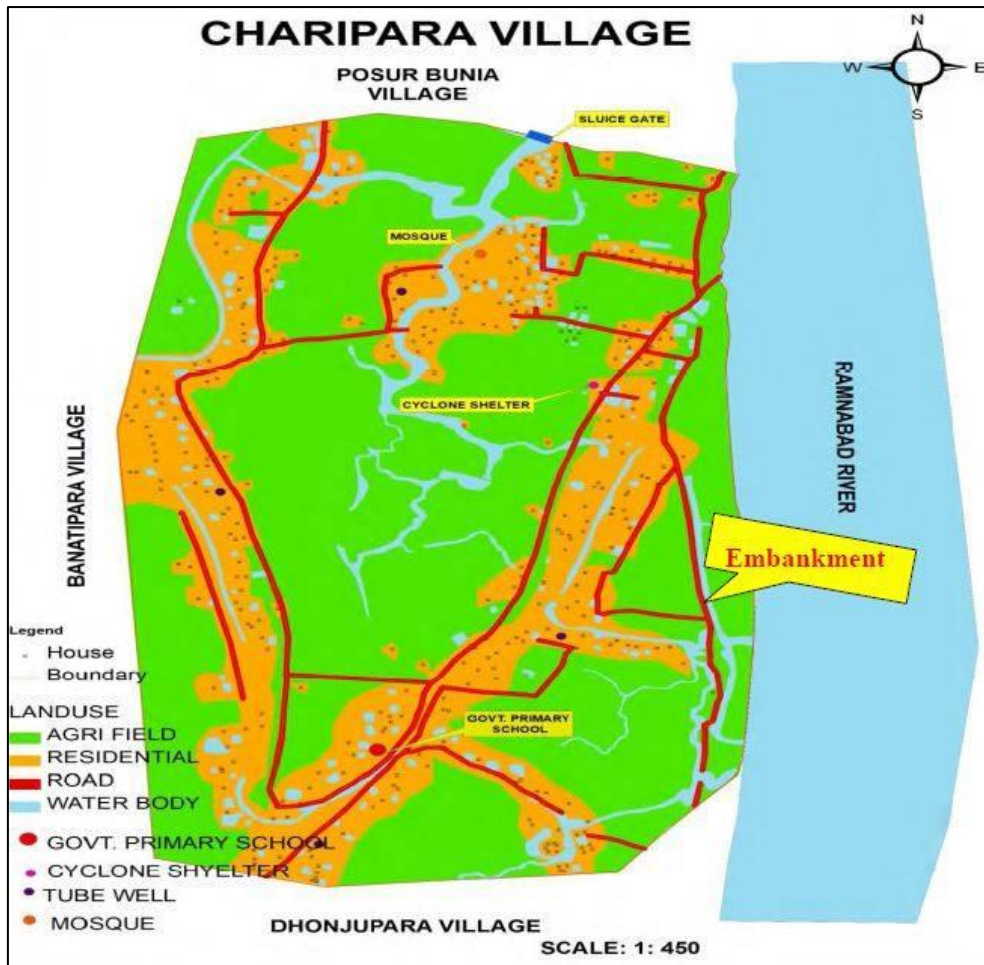
Tidal flood - short duration, height is generally 3m to 6m, blocks inland flood drainage is very common in our coastal area and affects every year. Till now, most of the studies focused on flood, cyclone, river erosion and salinity impacts. All these disasters have been focused only it's physical infrastructures impact and only post mitigation measures. But socio-economic impacts on any area turn into long term and there is no permanent solution of these impacts till now. Our study concerns with the existing socio-economic impact of tidal flood in coastal area and to observe the loss and damage scenario. For analyzing tidal flood impact charipara village of patuakhali district has been selected because of its maximum dependency on fishing and the geographical location and relation with sea belt.

## **Objectives and Methodology**

The main objective of the study is to find out the socio-economic impact. For this reason, the objectives are to observe the loss and damage scenario and the present mitigation measures for tidal flood in the study area. For the betterment of present situation, some suggestions from planning perspective have also been given. Both primary and secondary based data has been used. Questionnaire survey and office interviews are involved in primary data source.

## **Study Area Profile**

Charipara village is located in the 6 no. ward of 3 no Lualua union. In its north side: Pashurbunia village, south side: Dhanju para, east side: Ramnabad river and west side: Banatipara village. The village is beside the Ramnabad River which has strong current and people of the village termed this river as the reason of their sorrow. The length of Charipara village: 3.5 km. and width is 1.6 km (approximately). Ramnabad River is strongly co-related with the every sector of life and livelihood of Charipara's population. Major part of its residents catches fish and earns their living by doing fish business. Embankment made by Water Development Board (WDB) surrounds the east side of the village. This embankment protects the village from the tidal surge and at the same time works as a road of communication with the adjacent village. Some part of embankment was drowned two times in the river. Though the broken part of embankment was repaired but still that part is in risk. But this embankment is not enough to protect the village from continuous tidal waves.



Source: Haque, 2014

## Causes of High Tide and Coastal Flooding

Coastal floods are extremely dangerous, and the combination of storm surge, tides, river inflow, and waves can cause severe damage. There are some specific reasons which promote high tide and flood in coastal areas of Bangladesh. They are given below:

- Severe weather events create meteorological conditions that drive up the water level, creating a storm surge. These conditions include strong winds and low atmospheric pressure that can be caused by tropical cyclones, by mid-latitude extra tropical storms or by any severe weather conditions.
- Large waves, whether driven by local winds or swell from distant storms, raise average coastal water levels and can cause large and damaging waves to reach land.
- A normal variation in the astronomical tide cycle promotes high tide. When a severe storm hits during high tide, the risk of flooding increases significantly.

- Depending on the storm event, flooding from storm surge may be combined with river flooding from rain in the upland watershed, thus increasing the flood severity.
- Other larger scale regional and ocean scale variations, caused by seasonal heating and cooling and ocean dynamics, can contribute to high water levels.

Different part of Charipara is vulnerable to different disaster. As for example- East- North part of the village is vulnerable for river erosion and total north part is the most saline affected area. But tidal flood doesn't focus any specific area; it can flood away any part of this village. From field survey, timing of tidal flood experience of Charipara village has been concluded, which is given below.

<b>Tidal flood experience of 2013-2015 in study area</b>	<b>Timing of tidal flood</b>
Higher percentage of high tide occurrence	April-June, October-December
Lesser percentage of high tide occurrence	February-March

Data and information gathered through household questionnaire survey represents the scenario of vulnerability of tidal flood in Charipara village. From household survey it is found that about 87% families are strongly vulnerable to tidal surge and coastal inundation.

### **Loss and Damage Scenario in Socio- Economic Sector**

The tidal flood creates superior loss and damages in socio-economic impacts upon the villagers life. It can categorize into two parts:

- Impact on Income sectors
- Different type of damages of socio-economic sectors

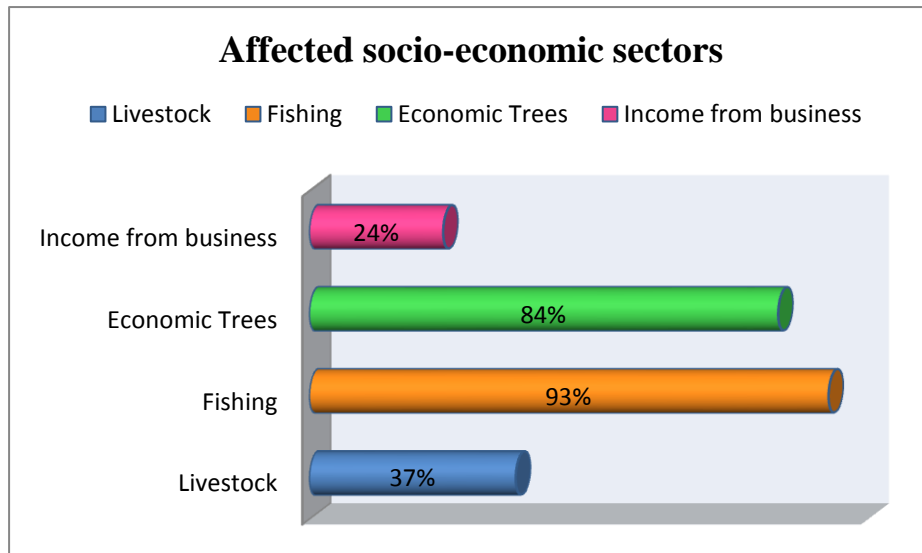
#### **Impact on income sectors**

Impact on income sectors describes the livelihood dependency activities of any area. In Charipara village, the main impacts are on income sectors. From field survey the main impacts have discussed below:

- **Impact on Fishing**

For being a coastal area and the longest sea shore, most of the people of this village depend on catching and firming of fish. But this occupation is being disturbed due to high tide and

flooding. After the continuous occurrence of these disasters, the rate of mother fish has been demolished totally. Increasing salinity is also responsible for the loss of fish in rivers and canals. In general time, the quantity of catching fish has also decreased because of post flood impact. Early, it was thought that flood will enhance the rate of fish in water bodies, but the continuous high tide of Charipara has proven wrong this concept. Fisherman now has to depend on another works for earning livelihood, which is really pathetic.



Source: Field survey 2014

### Impact on Economic Trees

People of this area used to earn by depending on different economic trees, as fruit or other vegetable production. But high tide and post flood impact has destroyed this income source. When the tide becomes high, the biometric pressure increases the motion of wind, and the trees lay down on ground. In charipara village, this has become a regular scene after 2 or 3 months. New cultivation is also disturbed due to high rate of salinity. People, who were self-dependent on food by their own garden and trees, have become affected through food shortage for the destruction.

- **Impact on Livestock**

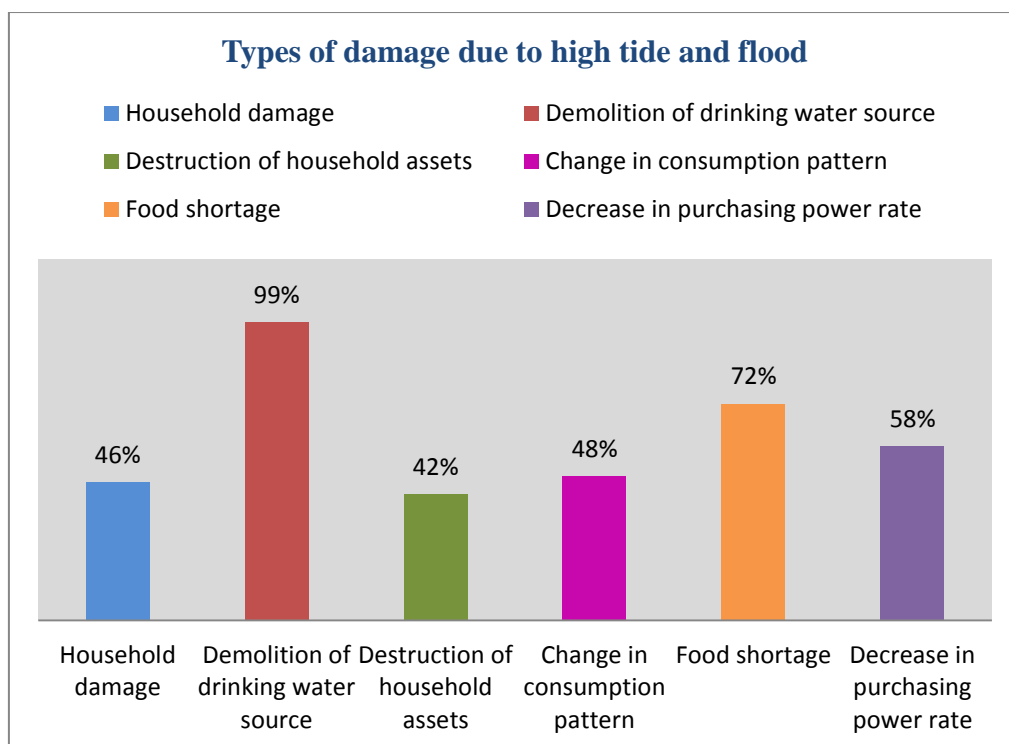
Most of the people used to household firming as chicken, duck, cow, goat etc. The firming of cattle helps them to add income for their livelihood. But during high tide, these livestock are flooded away. People don't have enough money to buy and firm again. Sometimes they have to sell those for saving their home and family.

- **Income from Business**

The small business dependent people as like grocery, cloth or vegetable seller faces huge problems due to the extreme tide, people sometimes don't get any chance to keep their stock or goods. Sometime all their products and goods flown away through the tidal wave with the shop itself. They don't get much compensation for those goods.

### **Damages due to high tide and flood**

Apart from the discussed impacts, there occurs several damages which creates social-economical loss. They are discussed below:



Source: Field survey 2014

- **Household Damage**

Every year, charipara become affected with high tide, which results in cyclone or flood. The village households become affected because maximum house roofs are made of iron sheet which can't bear strong wind and floor is made of earth, which easily become flooded away with wave. On the other hand, the electricity system depends on solar/ PV which also become destroyed with this disaster. It needs much time and cost to recover household damages because the poor villagers don't get any help for this purpose.

- **Demolition of drinking water sources**

The main drinking water source of Charipara village is borehole and pump. Tubewell has become inappropriate because of salinity. These water sources become demolished and polluted due to tide. Sometimes people have to drink saline water due to the scarcity of pure drinking water. Pumps also got dumped or jammed due to the gathering of wastages, leaves during tide. There is no specific alternative water supply source and for this reason people have to drink unsafe or polluted water during post- flood period.

- **Destruction of household assets**

Household assets like television, cycle, net, boat etc. flooded away and people become helpless without those. A Fisherman has to buy net more than 2/3 times within one year and if the boat got damaged, there is no way to buy another and the repair sometimes become burden for them. There is no shelter on which they can depend to keep these things.

- **Food Shortage**

People of Charipara get only VGF food after disaster, only 10/ 15 kg rice, which is not enough for any family till then the recovery period. Though maximum people in this village are fisherman and there is no scope for them for food storage, people have to pass their days without food or food shortage.

- **Change in consumption pattern**

It is a long time impact which change with the passing time. Agriculture based families have to depend newly on fishing activities, sometimes fisherman's family have to adjust newly with other occupations. Food scarcity also forced people to change their consumption pattern.

- **Decrease in Purchasing Power Rate**

Due to continuous effect of flood purchasing power of people decreases over year. They can't afford education and health facilities maximum time in year, due to post disaster impact. Sometimes the daily consumption pattern change

## **Present Mitigation Measures and existing policy for study area**

There are no specific mitigation measures for tidal flood, as it occurs suddenly and can turn short or long term. People of this area are now one kind of used to about this disaster. The only preparation in this area is making announcement through mike before one day about high tide by observing the motion of wind and storm surge. There is no shelter home in the

village; people have to move out nearby villages. Local government only distributes VGF food and talks about embankment construction and infrastructure development. But these physical measures are not enough to recover the socio-economic loss. Long term adaption measures and combined involvement of local government and people's participation is necessary.

### **Long term mitigation measures to mitigate damages from tidal flood**

**Mitigation Measure for vegetation and drinking water source:** The coastal people shouldn't only depend on fishing, because water dependency has become their weakness and not improving socio-economic condition. The storage effect of vegetation, soil, ground and wetlands has an important mitigating effect particularly in minor or medium-scale floods. Each of these storage media is capable of retaining certain quantities of water for a certain length of time. A large natural storage capacity provides slow rises in water levels and comparatively minor floods. Retaining water on the natural media should have priority over swift water run-off. In some cases, in the event of heavy and lasting rainfall, natural storage impact is less relevant as regards the reduction in flow, but is still extremely beneficial when it comes to reducing sediment yield. A strategy to manage tidal floods in an ecological manner should be based on improving river basin land-use, prevent in rapid run-off in coastal areas, and improving a transnational effort to re-store ' coastal flood zones. Besides flood mitigation, this leads to eco-logical benefits in the form of maintaining biodiversity, often recharging underground aquifers and cleaner water for drinking, areas for recreation, opportunities for tour-ism and so on.

Some preventive non-structural measures which can save socio-economic sector from being affected are given below:

- Conserve, protect effectively and, where possible, restore vegetation and forests in mountainous areas, riparian woodland and meadows.
- Maintain and expand the forest population in the river basin by semi-natural reforestation, particularly in mountain and hilly ranges.
- Conserve, protect effectively and, where possible, restore degraded wet-lands and floodplains, including river meanders, oxbows, and especially reconnect rivers with their floodplains. The maintenance of the vegetation edging a water-way is however necessary in a way that is both respectful of the wealth, fisheries, biodiversity of these environments, and effective against the risk of tidal flood damage.



- Improve land reclamation including reducing the drainage of the landscape, reversing the straightening of water-courses and bank reinforcement: “let rivers spread”. All work relating to draining swamp lands and drying damp and un-sanitary land shall be considered as contrary to the objective of flood prevention.
- Reclaim former flood plains and lakes, when possible, for example by relocating dykes, opening natural levees by creating inlets at the deepest terrain sections, in order to reincorporate these areas as natural retention areas into the discharge dynamic.
- Ensure land uses that are appropriate to areas prone to flood and erosion, enhance soil conservation by avoiding excessive soil compaction and erosion, develop a network of agricultural roads and practices such as contour tillage which would take into account water retention objectives and ecological requirements, and change the vegetation cover (grassing of sea belt and flood plain areas, convert arable land into pasture-land).
- Develop manageable tidal flood polders, which should preferably be used as extensive grassland or to restore alluvial forests, at selected locations of former floodplains to lower flood peaks.
- Increase the flood conveyance capacity of the flood bed in the middle and lower river sections where natural slope of the river is too little by making every possible effort to dismantle manmade obstacles of flow, by encouraging appropriate land uses, e.g. rehabilitation of pastures and mosaic type floodplain forests in the floodway, by creation of bypassing channels in the flood bed (where possible and if necessary), by increasing the flow capacity of bridge sections.
- Measure the effectiveness of actions on flood wave run-off, particularly dyke relocation and the development of flood polders.

Some policies can help to develop good management practice, which should include:

(a) Draw up a long-term flood prevention and protection strategy that covers the entire Trans boundary coastal basin and its entire water movement system rather than the trans boundary watercourse so the fishing activities can be observed and preserved.

(b) Include in the strategy at least such major objectives as reduction of the risk to health and damage to property; reduction of the damage scale of floods; building of tidal flood

awareness; and the set-ting-up or improvement of flood notification and forecasting systems.

(c) Draw up an inventory of all structural and non-structural measures to prevent, control and reduce tidal floods; analyze the existing scope of flooding and human activities based on a risk analysis that goes beyond national borders in the catchment area; and identify the inadequacies of the existing scope of the technical and non-technical flood control and preventive measures.

(d) To achieve the long-term goals of flood-related risk management, draw up an action plan that contains all the measures that came up as a result of their view and have been ranked according to their relative importance and timetables.

### **Conclusion**

Some NGO's have been taken some steps to cope with the post tidal flood impact, as providing housing materials which can resist the flood impact, trying hard to create new drinking water sources. But these are not enough to recover the socio-economic impacts of this type of continuous disaster. Climate change is not a sudden occurrence, it takes time to happen. So to control the negative impacts, it needs more effective co- ordination of infrastructural and non- infrastructural measures. Moreover, a problem based solution for the betterment of the effected people's life is essential.

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