

**Local Perceptions of Climate Change:
A reference to changes in water level**

by
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In Khulna of Bangladesh, the Rupsha-Bhairab is a major tidal river system flowing on the east of the city. This system river is well connected to the Bay of Bengal through the 2nd largest sea port (Mongla sea port) of Bangladesh, plays vital role in social, economic and environmental sustainability of the third largest metropolitan city of Bangladesh. Results of our direct observation and discussion with multi-level local stakeholders said that this mighty river system has been changing its natural behavior due to unregulated human interventions and sea level rise due to climate change. This initial field study has been conducted to analyze the local peoples' perceptions of climate change in Khulna. Observed changes in river water level was the primary indicator for this the study. For this purpose, a mixed livelihood group of people were interviewed at different locations of Bhairab-Rupsha rivers system in Khulna. A brief summary of the stakeholder's perceptions is given bellow.

Table 1: List of the selected livelihood groups.

Location	Livelihood group
<i>Alutala</i> under Jalma union of <i>Botiaghata</i> upazila of Khulna	Local farmer
	Fisherman
	Sluice gate operator
Rupsha ferry <i>ghat</i> , Khulna	Wood broker
	Fisherman
	Local shopkeeper
	Boat man
	Ferry driver
BIWTA ferry <i>ghat</i> , Khulna	Labor union leader
	BIWTA Officer

Alutala is located approximately 10 km away from the Khulna City. It is a part of *Jalma* union under *Botiaghata upazila* in Khulna. There are 7 unions in *Botiaghata upazilla* and *Jalma union* is the biggest one which has 33 villages. At *Alutala*, about 250 households depend on a single water source. However, there is no cyclone shelter at *Alutala*. The river Rupsha and Moyur have been flowing towards south-east and northwest direction of the village, and thus, it is vulnerable to annual flood and climatic disasters. Local respondents at *Alutala* said that, water level of Rupsha has been decreasing. They feel that construction of the Rupsha Bridge is one of the main reasons behind it. They also added that water current has also been decreasing due to sedimentation. One the other hand, the gate operator of *Alutala* regulator said that tidal water level at Rupsha River has been increasing (Table 1). He said that once he used to measure the

water level at regulator point but now it is stopped since long by the authority. Other respondents at the same time said that rainfall pattern has been changed in the area and people suffer from frequent fever, diarrheal diseases, headache, allergy and nausea. Absent of rainfall in due time is a major perception of climate change of the local farmers. Farmers at this site informed that now they used to irrigate crop lands in dry period, but earlier they used rain fed agriculture in the same lands. The entire respondents feel that climate has been changing rainfall is becoming scarce in dry season. Climatic disasters like cyclone and storm surge have also been occurring more frequently than the past, said by the local stakeholder at this site.

Table 2: Perceptions of changes in water level during high and low tide in Rupsha.

Time	Season	High tide (RL)	Low tide (RL)
1990s	Dry	10	2-3
	Wet	14	5-6
2000s	Dry	11	2-3
	Wet	16	6-7
2010	Dry	13	3
	Wet	16	7-8
During Aila	May	18	10-12

Source: Interview with regulator operator on May 3, 2011.



Figure 1: Local stakeholders' consultation at *Tetultala* Bazar near *Alutala* regulator.

Mr. Golam Rabbani, a local wood broker at ferry ghat informed that Rupsha river has been drying after the construction of the Rupsha Bridge and the depth of the river is decreasing day by day. He added flooding condition of this area has been increasing. Sometimes flood water level becomes very high due and flooded the ferry ghat area. Mr. Robbani explains that Rupsha ferry ghat road was built in 1980. That time ferry ghat road was not flooded and the road was about 2-3 ft high than the high tide level. But now it becomes flooded frequently during high tide. He tells that water level of Rupsha has been increasing. Mr. Robbani also feels that during the last 15 to 20 years river bed has been filled up by huge siltation. However, water pressure from the sea is also increasing. Natural disasters, like flood, drought, cyclonic storm surge has been increasing, but causes behind these extreme weather events are unknown. Mr. Robbani lost all of family during the cyclone of 1991. He said that weather pattern is being cruel because of the bad human behavior on the nature. Finally, Mr. Robbani comments that after 10 or 15 years each people should be required at least:

- A website: for storing personal information and information regarding disaster monitoring.
- Money to purchase drinking water from the market
- Insurance: for recovery.

On the other hand, Mr. Jamal Uddin (wood braker) said that water level has been increased in Rupsha ferry ghat area, especially during *Ashar* (mid June-mid July), *Srabon* (mid July to mid August) and *Vadro* (mid August - mid September). He feels that floodplains are mostly closed now. But earlier there was a free flowing of river water (flood or tidal water) into the floodplains and low lying areas. As a result river bed has been silted up as there is no place for free flowing tidal water and sediments it bears. The difference between the water level of high tide and low tide are 10 to 12 ft. However, before Farakka the tidal influence was less in Rupsha-Bhairab. Main tidal influence was in Mongla point. But now upstream freshwater flow has been reduced due to the Farakka Barrage and tidal influence most in the Bhairab-Rupsha river system. Mr. Uddin said that long before (1985) big launch used to go Narail, Borodia and Kaliya from Khulna, but now it has been closed due to the reducing of navigation in Rupsha-Bhairab River. Earlier water from Padma used to come at the Rupsha through Modhumoti River. After 1880s it has been closed, and saline water started to come upwards from the Bay of Bengal. These factors have increased salinity in water and soil in Khulna and peripheral area.

A local boat operator Md. Rubel Sikder (23) said that during high tide Rupsha ferry ghat road becomes flooded. After construction of the Rupsha Bridge this river has been drying day by day. He added that width of the river Rupsha has been decreased at least 200 ft during the last five years. He said that he did not hear anything about climate change and its impact in Khulna. Mr. Nazrul Islam (60) is a local shopkeeper at Rupsha ferry ghat area since 1978. At present his

livelihood at risk due to the establishment of Rupsha Bridge. He said that his income has reduced significantly as very few people use the ferry communication. Now he earns about 100 per day but earlier it was about of 200 or more. According to Mr. Islam this year water level is slightly high than the previous year. He perceives that the weather pattern is not good this year. He referred that during Cyclone Aila, water level was significantly high. That time his shop was gone under water. He comments that he has never seen such a big cyclone like *Aila* and *Sidr* in his life. He heard about climate change, and said that due to the climate change, local fruit production has also been decreasing significantly. Now production of the coconut and other fruits is very less in this area. He feels that now weather is too much polluted to produce agricultural production.



Figure 2: The tidal water level reached to the road level of Rupsha ferry ghat.

Mr. Kader (Ferry user, 75) lives at Rupsha since 1960. He said that the ferry ghat has been shifted downward about 200-300m from its original location. Now west side (Khulna side) has been eroding and east side (Bagerhat side) has been silting up. Earlier long wave height and high water current were prominent in the Rupsha River. But now it has been reduced significantly. During pre Farakka water depth at the ferry ghat was about 100-150 ft. now it is only 30-35ft. He also said that now water holding capacity of the river has been degraded because of silting up of the river and as a result water level has been increased.

Ferry driver Mr. Mozid Gazi (75) said that water level during high tide is higher than previous years or period. He added that now tide height is higher during high and low tide. Mr. Gazi said

that the sea water level also increasing. He also feels that earlier there were lots of open floodplain but now they are closed. As a result this phenomenon also increase water level in this area.

A local fish merchant Mr. Shah Alam said that after construction of the Rupsha Bridge, water depth has decreased at least 10 to 12 ft. He added that 20-30 years back; water depth at ferry ghat point was around 90 to 100 ft. But now it is only 30-35 ft, said by the local fisherman. Around 200 commercial fish depot is present at ferry ghat area. During Aila fish all depots were flooded by the water depth of about 1-1.5 ft. Now water is less in the river. River navigation has also been reduced due to huge sedimentation. Construction of Rupsha Bridge affected this navigability. Rainfall has been decreasing in Khulna. However, temperature has been increasing there.

According to Port and Traffic Officer of Bangladesh Inland Water Transport Authority (BIWTA), Mr. Munshi Mohiuddin, water level of the Rupsha has been increasing. He said, the present yard of the BIWTA was built about 25 years back. That time yard was not flooded because it was built about 1-2 ft high above the high tide level. But now it becomes flooded during high tide in most of the year, especially during monsoon. This indicates that water level has been increased. In July water level becomes very high and that time main road at BIWTA ghat goes under water. Last year water level increased more than 1ft than that of the previous year.



Figure 3: BIWTA's port and traffic officer Mr. Munshi Mohiuddin is showing the signature changes in water level Rupsha-Bhairab river system at Railway *Kastom Ghat* in Khulna.



Figure 2: Figure shows the tide protection embankment at Railway *Kastom Ghat* area. Earlier it was about 1-2 ft. high from the high tide level but now it becomes flooded due to tidal influence. The sediment signature shows the flooding condition of the embankment BIWTA *Kastom Ghat*.