

## Decay of the river Baniadaha and its impact on the surrounding environment

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### Abstract

Cooch Behar district is a land of many perennial rivers. According to the Kochbihar Royal history 'Baniadaha' river is a distributary of river Torsa and this channel was the navigational route between Bhetaguri and Bangladesh. But at present, like all other rivers of foothills of North Bengal, it is in critical stage of decay. On the basis of field investigation it has been found that the consequent decay of the channel is due mainly to unscientific discharge of domestic waste, construction of unauthorized culverts and bridges across the river, dumping of garbage by the encroachers, rapid sedimentation at the off-take point and the embankments construction activities have finally tolled death knell of the 'Baniadaha'. It ultimately turned into a paleo channel for the south-eastern part of Cooch Behar district. At many places the course has totally dried up. The decay of Baniadaha is now considered to be the main cause for water logging and various types of water borne diseases in the surrounding area of this river. The waterway is already gasping for life with the continuous interruption of human beings causing almost total degeneration of the channel. The present study endeavors to examine the different causes and consequences of the decay of the Baniadaha channel from its off-take at Boro Atharokotha (26°18'39.08" N, 89° 25'22.77" E) from the parent river Torsa to confluence at the Dharla River in Bangladesh (25°56'11.44" N, 89°31'49.77" E) and suggests suitable remedial measures for its revival.

**Keywords:** Objectives, Causes of decay, Consequences and Remedial measures

### Introduction

Before 20<sup>th</sup> century the river "Baniadaha" was an important and main navigational river channel in Cooch Behar district. The Baniadaha has a meandering channel for most of its passage through Cooch Behar sadar and Dinhat sub-divisions. This stream flow through a large part of Cooch Behar-I block which is known as the "Mara Mansai". From Bhetaguri village onwards, this mighty river is known as the

"Baniadaha". It originates from Cooch Behar district of West Bengal and passes through Cooch Behar sadar and Dinhat subdivision of Cooch Behar district in south easterly direction before entering Bangladesh and finally joins the Dharla River near Indo- Bangladesh boarder. The Baniadaha river rises in the Cooch Behar district at an altitude of 38 m, located at 26°18'39.08" N latitude and 89° 25'22.77" E longitude. It joins the Dharla River at

Phulbari Upazila in Bangladesh after traversing a distance of 97 km approximately. The Baghroa canal was dug from the Torsa River at Bhajanerpur village and meets with Baniadaha River at Garo para village (26°15'49.54" N, 89°29'47.38" E), near Dewanhat. This river is a left bank tributary of river Dharla and also a distributary of river Torsa. In early 20<sup>th</sup> century, the river Baniadaha discharges heavy quantities of water in any season. But this important and well-known river of Cooch Behar district is now highly polluted and on the verge of disappearing. According to the Kochbihar Royal history, "Baniadaha" was an important navigational channel for trade and business between Bhetaguri and Bangladesh.

### Problems

On the basis of field investigation it has been found that the river Baniadaha is decaying gradually. The problem under study is to assess the nature of decay of the river Baniadaha and to determine specifically the process of degeneration both natural and anthropogenic, in details through data generated from intensive field work. The nature and role of the river have been changing due to those problems; the river has converted into being merely carriers of huge amount water. Excessive siltation and accumulation of wastes have lead to the stoppage of water communication via this channel. Moreover the dumping garbage and huge amount of eroded soil particle are gradually loading the channel of the river, for which nowadays flood has become a major problem in this area.

### Study area

The study area is located at the right bank of the Torsa river and south-eastern part of the Cooch Behar city of West Bengal. The Cooch Behar district (25° 57' 40" North to

26° 32' 20" North and 88° 47' 40" East to 88° 54' 35" East) covering an area of 3387 sq. km is divided into 12 blocks. It is situated on the northern plain of north Bengal. Present study includes Cooch Behar sadar and Dinhata subdivisions. It extends between latitude 26°18'39.08" N to 25°56'11.44" N and longitude 89° 25'22.77" E to 89°31'49.7" E. It is covered by the survey of India (SOI) topographical maps numbered 73F/7, 73F/11 and 73F/12. The study area is traversed by a number of cut-off (bill) and paleo channels and streams which are mostly seasonal and flow in their full capacity in rainy season.

### Methodology

This research work is based on the empirical study of decay of river. A systematic methodological principle was followed in this research work. The entire work can be represented in the following manner –

#### 1. Pre field study:

At the beginning intensive literature review from related books, journals, articles, government publication, direct investigation etc. has been done to specify the research problem and selecting the study area and topic of this research work. The spatial information has been collected from different govt. office like Water and Irrigation Division, Cooch Behar; Disaster management Office of Cooch Behar was also taken in to consideration.

#### 2. Field study:

Primary data has been obtained through intensive field survey in selected sub divisions of Cooch Behar district. Photographic records of the related features have also been collected. The study of imperial observation has been done very carefully through measurement and analysis process to know the decay of Baniadaha River and existing management structure.

3. Post field study:

Data and others information available and generating on the field were compiled using appropriate modern techniques on computer and satellite images, topographical map and drainage map of irrigation department. The collected data have been quantified, analyzed and synthesized by using standard statistical methods.

**Objectives**

Severe, precise and rational Objectives have been chosen for the scientific study of the above mentioned problem of the study area, which are as following:-

1. To highlight the problem of decay of river Baniadaha.
2. To emphasize the causes of decay.
3. To examine the nature and extent of this.
4. To evaluate the impact of decay.
5. To reestablished the channel as navigational network.
6. To suggest suitable prevention measures.

**STUDY AREA**

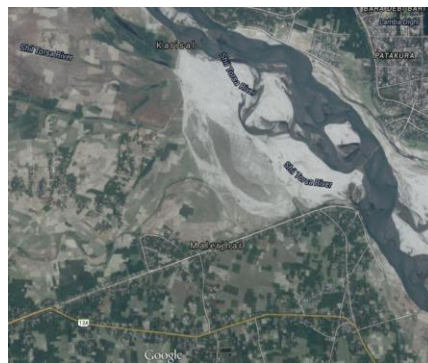
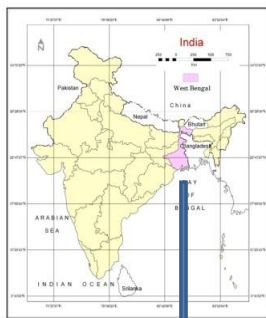


Figure-1 Off-take of River Baniyadaha at Boro-Atharokotha.



Figure-2 Off-take of Bagroya canal at Dhair Hat.



Figure-3 Bagroya canal meets with Baniyadaha river at Garo para village.



Figure-4 Confluence of River Baniyadaha in Bangladesh.

### Literature review

Before 20<sup>th</sup> century DR. Anvil (1752), James Rennell (1781), Tossin (1840) and Hunter (1874) prepared ancient river maps of West Bengal. Here are the following articles and books published in the twentieth century should also be mentioned of- 'Banladesh Nod-nodi o Parikalpana'- (1959) by Kapil Bhattachariya; 'Banglar Nadi Kotha' (2008) by DR. Kalyan Rudra; 'Banglar Nad Nadi' (2007) by Dilip Kumar Bandhyapadhyaya; 'Paschim Banger Nod Nadi' (2002) by Ashok Kumar Basu. According to the official report by Water and Irrigation Division, Govt. of West Bengal, Cooch Behar, there could be number of reasons for the decay of River Baniadaha as well as changing nature of main channel.

### Causes of decay

There are several causes of decay of River Baniadaha, which are as follows-

1. Excessive siltation and accumulation of garbage have gradually reduced the navigational capacity of this River.
2. On the basis of field investigation it has been found that the rapid sedimentation at the off- take point of river Baniadaha is the major problem for decay of this River.
3. Tapur Hat-Bhogdabri-Kesharibari Embankment and national highways Constructions activities will finally sound the death knell of the River Baniadaha.
4. The consequent decay of river Baniadaha is due mainly to unscientific discharge of domestic waste; construction of unauthorized culverts and bridges on the river bed and also construction of unauthorized roads across the channel.
5. Dumping of garbage by the encroachers/ villagers on the river and unplanned constructions, namely and railway

construction works caused further silting of Baniadaha river.

6. Another cause of decay is Boro cultivation, jute processing and similar other agricultural practices. For which a huge amount of eroded particles flow in the river channel by surface water, which uplift the bed of river Baniadaha and flood occurred rapidly. During jute washing process a huge amount of debris and mud falls into the river bed, which changes the fluvio-dynamic status of river Baniadaha.

### Results and discussion

This river usually contains very small quantities of water during winter and summer season. Low lying flats are characterized by flood plain topography with general slope towards south east where most of the agricultural activities have been noticed.

Throughout the last hundred years or so, the increasing rate of siltation in off-take of the river Baniadaha has given rise to a deep sense of anxiety. Excessive siltation and accumulation of garbage have gradually reduced the navigational capacity of his river. The nature and the ancient navigational role of Baniadaha have been changing regularly and they have been reduced to being merely carries of flood water of surrounding villages in rainy season. At some places the course has totally dried up.

A large portion of the river bank is brought under boro cultivation; there are also several agricultural fields present along the river bank, due to which loose particles are being deposited in the river bed. Consequently, the river bed has been rising at a very high rate, in the last few decades, and as a result, a large low-lying portion of Cooch Behar I and Dinhat was under flood water for several days.

**CAUSES OF DECAY**



Figure- 5.-Excessive siltation at off-take point of river Baniadaha.



Figure- 6. Agricultural practice on river bed at Ghagir ghat village.



Figure- 7. Agricultural practice on river bed at Garo para village near Baghroa canal .



Figure- 8. Construction of road across the river channel at Panishala village.

**CAUSES OF DECAY**



Figure -9. Construction of bridges on river at Ghagir ghat.



Figure- 10. Reduced channel width due to construction of culvert.



Figure -11. Agricultural practice on river bed.



Figure- 12. Unplanned habitation on river bed at Bhetaguri.

PRESENT STATUS OF RIVER BANIADAHA



Figure- 13. Baghroa canal meets with Baniadaha river at Garo para village.



Figure- 14. Dry channel of river Baniadaha at Dewanhat.



Figure - 15. Present condition of Baniadaha river at Ghughumari.



Figure- 16. Agricultural practice on river bed at Ghegir ghat village.

Flood can be caused by heavy rainfall and blocking of river by dumping of garbage as it reduced the channel width of Baniadaha. Some parts of Cooch Behar I block faces this hazard almost every year. Since population pressure on land is forcing people to occupy the flood plains of Baniadaha which are lucrative areas for human habitation and cultivation. Flood hazard results from excessive overflowing of river water over land.

The decay of River Baniadaha is now considered to be the main cause for water logging and various types of water borne diseases in surrounding area of the river bank.

The Baniadaha has created several meander cut-offs in their course. These cut-offs and other paleo channels are connected with the river during monsoon season. The vast agricultural areas are inundated during monsoon due to rise of the water level of this river.

Other factors such as population pressure, unplanned habitation and Excessive agricultural practice on the bed of River Baniadaha caused the river channel to change into a paleo channel and have gradually reduced the width of river.

**Table 1: CHANGING NATURE OF CHANNEL WIDTH FROM 1971 TO 2015.**

Profile number	Section line	Channel width (in metre)		Altitude (in metre)	GPS co-ordinate			
		1971	2015		Left bank		Right bank	
					Latitude	Longitude	Latitude	Longitude
1	A-A'	100.1	75.89	38	26°17'53" 26.56 N	89°24'30" 10.98E	26°17'52" 27.54 N	89°24'26" 31.46 E
2	B-B'	30.24	19.81	40	26°17'48" 36.39 N	89°25'55" 47.56 E	26°17'47" 37.38 N	89°25'55" 58.54 E
3	C-C'	25.35	Not found	37	26°16'15" 54.11 N	89°27'49" 34.39E	26°16'16" 53.11 N	89°27'50" 7.32 E
4	D-D'	50.05	30.28	37	26°15'18" 1.97 N	89°29'17" 55.61E	26°15'16" 53.11 N	89°29'16" 53.11 E
5	E-E'	47.5	27.72	40	26°15'50" 14.75 N	89°29'57" 15.37E	26°15'48" 41.31 N	89°29'56" 20.49 E



Figure- 17. Off-take point of river Baniadaha in 2015.

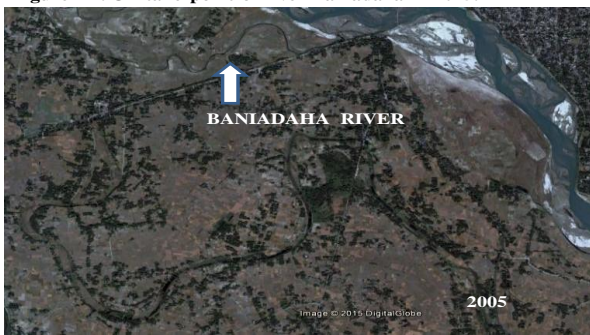


Figure- 18. Off-take point of river Baniadaha in 2005

**CHANGING NATURE OF RIVER BANIADAHA AT OFF-TAKE POINT**

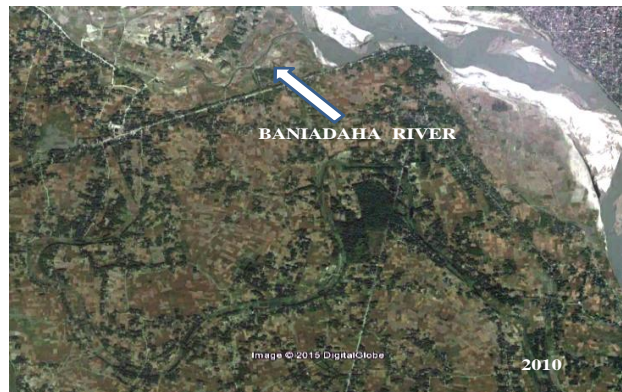


Figure- 19. Off-take point of river Baniadaha in 2010.

We have measured first channel width of river Baniadaha near National highway at Suktabari. Total width of this section is 100.11 metres in 1977 and 75.89 metres in 2015. The river channel Sinuosity of this area is 1.25.

Total channel width of the second section line is 30.24 metres in 1977 and 19.81

metres in 2015 near Tapur Hat. The river channel sinuosity of this area is 2.39.

Total channel width of the third section line is 25.35 metres in 1977 and channel is not found near North East Frontier railway (Koch Bihar branch) track in 2015. The river channel sinuosity of this area is 2.0.

Total channel width of the fourth section line is 50.05 metres in 1977 and 30.28 metres in 2015 at Ghegir ghat Highway Bridge. The river channel sinuosity of this area is 1.75.

Finally we measured last channel width near the Nawabganj Balasi village. Total channel width of the fifth section line is 47.5 metres in 1977 and 27.72 metres in 2015 and the river channel sinuosity of this area is 2.50.

From the topographical map 1977 shows us that the capacity, competency, discharge of water and channel width of river Baniadaha was very high and this river was also connected with parent river Torsa. The satellite images of 2005, 2010 and 2015 show us that river Baniadaha has got completely disconnected from parent river Torsa. The capacity, competency, discharge and channel width of river Baniadaha have also been reduced due to high rate of siltation, embankment construction, road construction, culverts and bridges construction and boro cultivation on the river bed.

### **Recommendation**

1. An appropriate measure should be taken to increase the rate of capacity, competency, velocity and discharge of this channel from its off-take point to confluence point.
2. A major emphasis should be given to reestablish the Baniadaha River as navigational network between India and Bangladesh. The use of the river for navigation may be the cheapest alternative way of handling the ancient transport facilities.
3. Eventually what requires to be done is to reopen the transport network as means of trade and business, tourism, fishing of the Cooch Behar district.

4. The river water should be allowed to use for all purposes like navigation, transport, pisciculture and tourism etc.

### **Controlling measures**

Proper step should be initiated to prevent further decay of the river channel. There are several techniques to control or minimize decay, which are as follows-

1. Off-take point of river Baniadaha should be connected with river Torsa by a canal, so that huge amount water may flow in the post and pre monsoon period through Baniadaha.
2. Due caution should be taken by the government regarding the construction of embankment and roads across the river bed.
3. The construction of bridges and culverts along the river, embankment on the river bank, unscientific use of water for agricultural purposes should be controlled by the local government.
4. Proper plantation of trees to protect soil erosion as well as to protect sedimentation in river bed.
5. The concerned authority should take measures to prevent the misuse of the river water for boro cultivation and dumping of garbage.
6. Proper steps should be initiated to restore the past condition like navigational situation of river Baniadaha.
7. To increase consciousness among the local people about the present status of the river Baniadaha.

### **Findings**

From the above comprehensive study I have assembled several important aspects, which are noted below-

1. According to field investigation, due to excessive siltation and construction of embankment at the off-take point the bed of river Baniadaha was totally

disconnected from the parent river of Torsa.

2. Only rainy season, river Baniadaha was drained by Baghroa canal and extremely tiny amount of water can flow through off-take from Torsa. At the downstream the capacity, competency, velocity and discharge are properly maintained.
3. I have assembled several causes of decay – due to gradual siltation of river Baniadaha and shifting of Torsa river which is completely disconnected from the parent river.
4. Unnecessary human interference namely construction of culverts and bridges reduce cross sectional area and discharge of river channel flow and lead to the dreadful condition of the channel.
5. Water of the river is used mainly for fishing, domestic, irrigation and boro cultivation. Local villagers have excavated large amount of water in Cooch Behar district for domestic purposes like washing, retting of jute etc. and irrigation purposes.
6. In the rural area, particularly in the flood plain area of Baniadaha River, channel is disappearing at faster rate under the population pressure and growing agricultural activities.
7. The high rate of return from the specially adopted monoculture practice like Boro rice has led to convert river channel into crops fields.
8. Some parts of river channel have been converted into agricultural land and dissected small ponds from Dudherkuthi village to Dewanhat.
9. Upstream of Baniadaha River is mostly affected by encroachment either for agriculture or constructions.

### Conclusions

In our country rivers play a significant role in the economic development of our

country. Rivers have bestowed boons and curse both on human beings. Decay of Baniadaha River causes total destruction of water body of this channel and renders it unproductive. As the decay of river is on a very slow process it does not draw attention beyond the local areas. The work force of the central and state governments, local self governing bodies, local people and NGO's are called upon to tackle an abnormal situation, especially the district authority should take more initiatives to save the river. The satellite imagery and topographical map play a crucial role in decays monitoring and mitigation in terms of providing geo-information to identify the vulnerable area. But taking protective measures helps to minimize the decay of river and sometime removes the threat altogether. Decay of river cannot be prevented in a short time but prior information can minimize the decay and death to the minimum. But this type of hazard prevention and mitigation can be successfully done if the state and local authorities along with the local people come together and cooperate with each other in the shared interest to all.

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