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## RESEARCH ARTICLE

### AN ENQUIRY INTO THE EVOLUTION AND IMPACT OF HUMAN INTERFERENCE ON THE CHURNI RIVER OF NADIA DISTRICT, WEST BENGAL

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#### ABSTRACT

Churni is a river in the Nadia district of West Bengal, India. It has been opined that the Churni is most probably an artificial canal, not a true river. Local history says, during the 17th century the river Churni was dug by the orders of Maharajah Krishna Chandra, the King of Nadia as a moat against the Bargees of Maharashtra. Only 80 years ago, in the 1930's, it was the major trade route inside undivided Bengal. Now, the river has lost its navigability. The river is subjected to different anthropogenic activities throughout its course. The upper stretches receive discharges of sugar mill effluents from the Darshana sugar mill factory (situated in Bangladesh) and the lower stretch in India is subjected to water obstruction by bamboo-made barrages at several places. Retting of jute in the river water has caused a rise in the river bed and enhanced the problem of silting and aggravated the problem of flood. Weed infestation is an emergent problem of the river. Encroachment along the river bank has narrowed the river. Unscientific agricultural practices along the river bank is also adding to the problem. The catchment area of this river includes a medium populated Ranaghat municipality. The opposite bank of this river comprises village residential areas and unorganized small-scale industries, which release their untreated effluents and sewage into the river. Several fish species appeared to have been eliminated from the polluted Churni river since 1983. The present paper is an attempt to analyse the origin, evolution and present conditions of the river and also to highlight the modifications caused by natural hydrological changes as well as by human interference which can provide a right direction for combating the problems of the river.

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#### INTRODUCTION

Since time immemorial, human civilization of our globe has chiefly centred on rivers and river basins. The early growth of settled human life in river basins is ascribed with the fact that rivers supplied the largest amount of needs of early societies which were mainly agricultural. The river is not simply a flowing mass of water. Besides water, river carries varieties of products including sediments and nutrients besides water, and builds up a vast stretch of alluvial tract of varying morphological characteristics. River has innumerable importance in civilization. The assessment of the rivers thus depends upon the potentiality of the varieties of use of its water and material it carried in. Therefore, the river has to be understood thoroughly to carry on this work.

##### Churni River at a glance

Churni is a river in the southern part of Nadia district of West Bengal, India. The entire district lies within the moribund sector of the Ganga Delta. The area through which the river flows is flat and the general aspect is that of a vast level alluvial plain. The river is almost 56 km in length. It is in its early old stage of flow. The riverbed is dumped with sediment, and full of small, often submerged river islands. In Rennel's map (1760's) there is no trace of Churni. Only 80 years ago, in the 1930's, it was the major trade route inside undivided Bengal. Now, the river has lost its navigability. The Churni is a distributary of the Mathabhanga river. The Mathabhanga originates from the rightbank of the Padma at Munshiganj in Kushtia district in Bangladesh. It bifurcates near Majhdia in Nadia district, creating two rivers, Ichhamati and Churni. The Churni flows through Shibnivas, Hanskhali, Birnagar, Aranghata, Ranaghat, and finally joins River

Bhagirathi-Hooghly near Chakdaha (Fig. 1 and 2). The river Churni is significant because it is a major source of surface water, it provides an income source for thousands of fishermen, it supplies fish as food to 0.3 million people nearby to the adjacent small towns of Ranaghat and Krishnagar.

##### Objectives

The objectives of the present paper are:

- To analyse the origin and evolution of the Churni River
- To probe into the present conditions of the river
- To highlight the impact of human interference on the river
- To suggest some measures to combat the problems faced by the river

##### Methods and Approaches

The present work is very much dependent on intensive field work. Previous literature has been of much help for getting an overall view of the study area. Data and base maps have been obtained from different published and unpublished sources. The approaches have been landscape and parametric, qualitative and quantitative, descriptive and analytical and above all cartographic and comprehensive.

##### Evolution of Churni

River Churni was most probably an artificial canal, not a true river. Local history says, during 17th Century, the King of Nadia (that time Nadia was a kingdom, now a district of West Bengal) was Maharajah Krishna Chandra. River Churni was dug at his orders as a moat against the Bargees or Bergirs of Maharashtra. At that time, there was

another important river here. It's name was Anjana. It had originated from Jalangi River, and confluenced with River Bhagirathi. A distributary emerged from Anjana near Jatrapur (Yatrapur), and confluenced in Ichhamati. At that time the lower part of Mathabhanga was known as Ichhamati, same as now. The flux of Anjana and the distributary increased with water of the canal. Later, the distributary was filled up artificially, and alluvial sedimentation jammed the upper part of Anjana. The canal and the lower part of Anjana is today's Churni (Fig. 3). That is why the river is also referred to as Kata Khal (dug canal). Thus, the river has been born as a result of human interference.

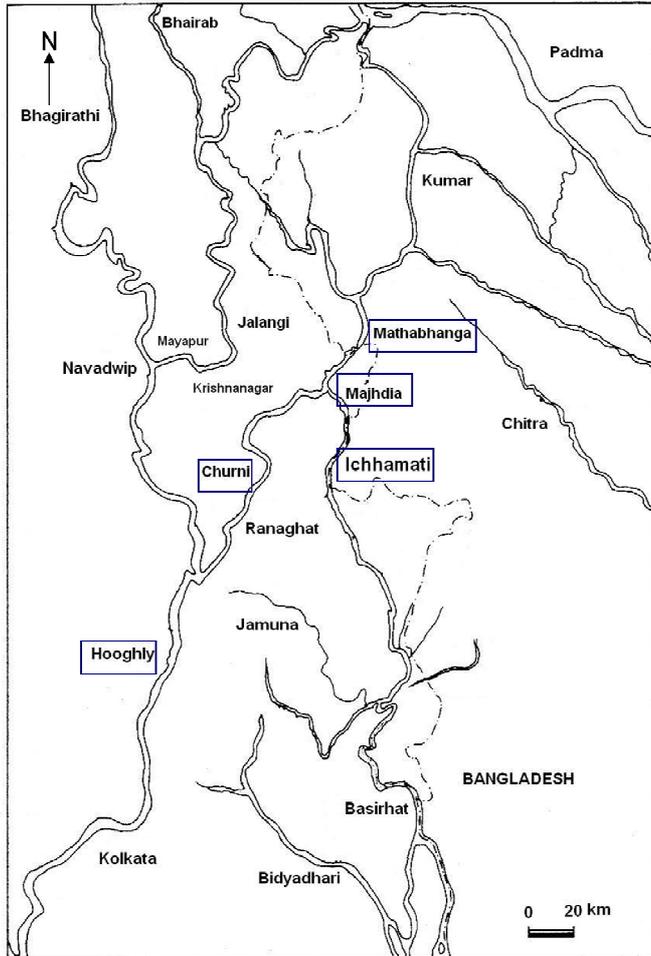


Fig. 1. Mathabhanga-Churni-Ichhamati River System

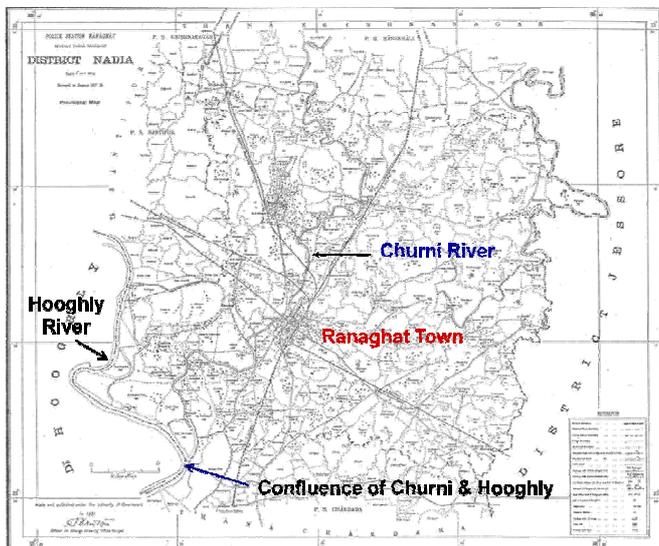


Fig. 2. River Churni flowing through the Ranaghat police station

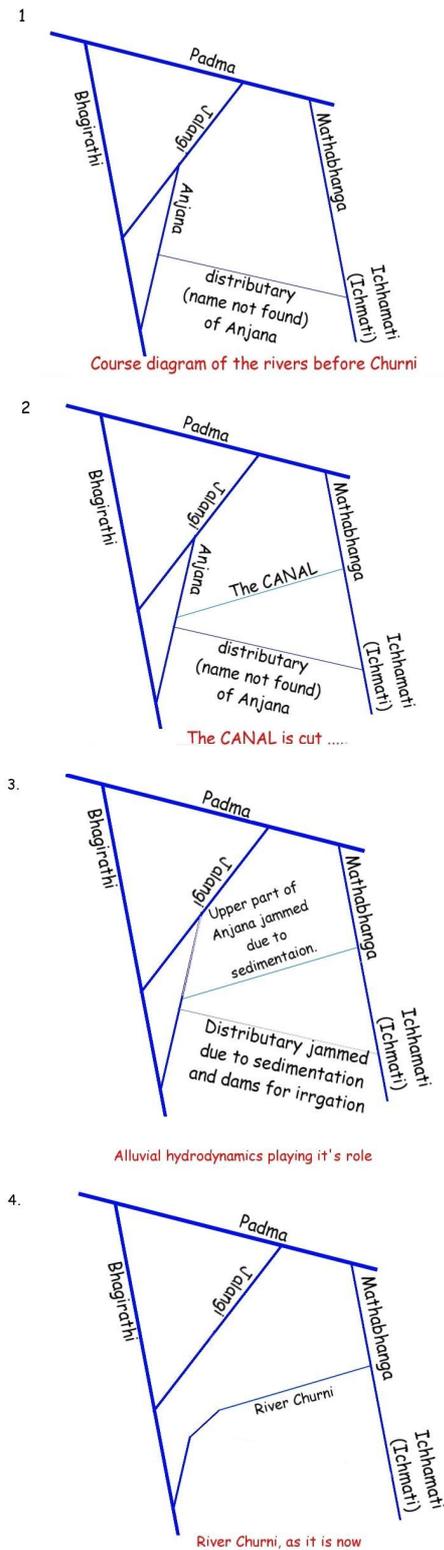


Fig. 3. Simple line diagram depicting the evolution of the Churni river

**Riverine Conditions**

The river (Plate 1) has erratic water flow causing floods over large tracts spilling over the banks during torrential rains, but remaining practically flowless during dry season. Link of the river with Padma remains cut off for most part of the year. Only in floods there may be some inflow from Padma into the river. The repetitive occurrence of the 9-metre contour in the area indicates that the ground slope does not have a persistent direction. The river is at a loss to find a perceptible slope and consequently have extremely intricate meandering courses. At some places the course of the river has taken a complete turnaround.



Plate 1. River Churni flowing beside Payradanga in Ranaghat P.S.



Plate 3. River Bank Cultivation & Cutting of Soil alongside the river bank

### Nature of Human Interference on the Churni

The river throughout its course is subjected to different anthropogenic interventions as mentioned below.

- Untreated industrial effluents and sewage from adjacent settled area are directly released into the river. The upper stretches receive discharges of sugar mill effluents from the Darshana sugar mill factory (situated in Bangladesh). The catchment area of this river includes a medium populated (0.140 million) Ranaghat municipality. The opposite bank of this river comprises village residential areas and unorganized small-scale industries, which release their untreated effluents (approximately 24,000 l/d) and sewage into the river.
- Bamboo-made barrages at several places on the lower stretches of the river obstruct the normal flow of the water (Plate 2).
- Retting of jute in the river is another significant issue connected to the deterioration of the river.
- Encroachment along the river bank by the illegal migrants especially from Bangladesh.
- Agriculture is practiced in an unscientific manner along the banks of river (Plate 3).
- Soil is being cut at an alarming rate along the banks of the rivers for supply to the brick kilns (Plate 4).
- Faulty anthropogenic structures like bridges have been constructed on the river.



Plate 4. Transfer of soil in mechanised boats to Brick-kilns alongside the Churni



Plate 2. Obstruction in the flow of the Churni river by bamboo-made barrages

The cumulative impacts of the aforementioned anthropogenic interventions lead to the following impacts on the river:

- Siltation in the river bed owing to the residues left after the retting of jute
- Increased intensity of Floods due to loss of depth of the surface water bodies due to excessive siltation
- Soil Erosion and Bank destabilization (Plate 6) due to river bank cultivation and cutting of soil along the banks
- Raising of river bed is a significant impact of the construction of railway bridge on the Churni river at Majdia (Fig. 4). While the bed of the Ichamati river is 14 feet higher than that of the Mathabhanga, that of the Churni is lower than Mathabhanga by six inches. During the lean period the level of water in the Mathabhanga is higher than that of the Padma. As a result, no water enters the Ichamati during the dry season. One of the

causes of silting of the river was construction of guard wall for Railway Bridge at Majdia (Plate 5).

- e. Industrial pollution is another impact. The upper stretches of the Churni receive discharges of sugar mill effluents from the Darshana sugar mill factory (situated in Bangladesh) and ultimately reach the waters of the Hooghly and gets spread in the entire area during floods. Several unorganized small-scale industries located alongside the river release their untreated effluents in them increasing the contamination level further.
- f. Settlements have sprung up alongside the river. Huge amount of sewage is thus regularly released into the river causing sewage pollution.
- g. Deterioration in water quality is bound to occur due to increasing levels of industrial and sewage pollution. The dissolved oxygen (DO) content in the river water is around 5 mg/l through most of the year (November–May). This DO sag indicates the continuous presence of substantial amount of dissolved organic load in the water. The average level of BOD is high due to occasional addition of degraded or partially degraded organic substances from the banks through erosion. The mean level of hardness is also high. The level of total nitrogen and total phosphorus is considerably high. The water is contaminated with bacteria possibly because of untreated sewage disposal to the rivers.
- h. Weed infestation (Plate 7) and Eutrophication in the river have taken place due to high levels of organic matter, nitrogen and phosphorus content in the water.
- i. Elimination of indigenous aquatic flora & fauna has taken place owing to pollution. 63.6% of fish species appeared to have been eliminated from the polluted Churni river since 1983. Out of 44 fish types found in 1983, only 16 are found today in the Churni. *Labeo bata* (Hamilton), *Puntius sophore* (Hamilton-Buchanan), *Mystus bleekari* (Day), *Rita rita* (Hamilton), *Setipinna phasa* (Hamilton), *Mugil korsula* (Forsk.) (Forsk.), *Xenentodon cancila* (Hamilton), have been completely eliminated from the river. The fishes of the river Churni have likely responded to ecosystem stress, resulting in the degradation of community structure. Decline in the number of fish species in turn affects the livelihood of fishermen. The people living alongside the river treat it like an open drain dumping almost anything and everything (even dead bodies of animals as well as faecal matter) into the river. All these have led to the overall degradation of the aquatic ecosystem of the Churni river (Fig. 5).

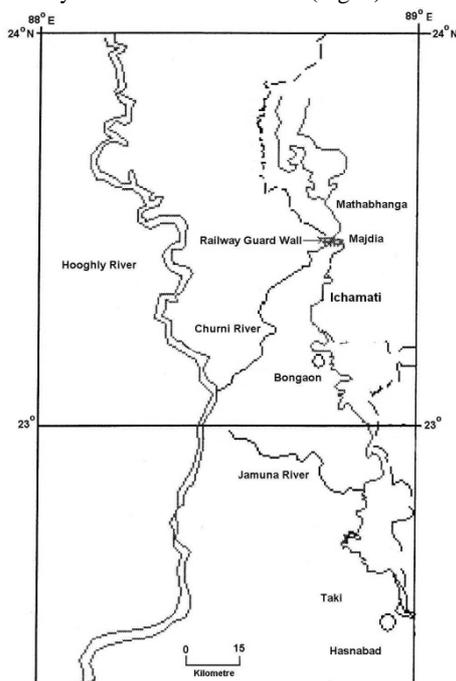


Fig. 4. Railway Guard Wall at Majdia obstructing the water flow into the Ichamati



Plate 5. Railway Guard Wall at Majdia on the Churni



Plate 6. Bank Collapse caused by the Floods of Churni River



Plate 7. Weed infestation in the Churni River

### Concluding Remarks and Mitigation Strategies

In general, the dissolved organic load is a likely cause for concern in the Churni river, which regularly receives untreated municipal and industrial sewage. The excess phosphorus may trigger proliferation of

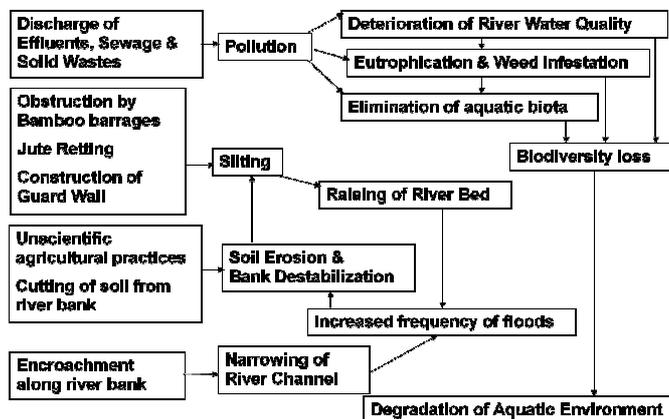


Fig. 5. Impact of Human Interference on the Churni River

nitrogen-fixing algae, thereby enhancing the state of eutrophication and loss of biodiversity. The river bed needs to be excavated in order that there is flow of water during the lean season. Discharge of both untreated industrial effluents and sewage in the river should be prohibited. Since this is required to be done both in India and Bangladesh, there is need for accord on this point. It is imperative that more water is needed to flow through Mathabhanga to reach the Pabakhali point at Majdia in the Nadia district of West Bengal and allow a certain quantum of water flow to Ichhamati through a feeder channel of about 9 km length, to be cut connecting Mathabhanga with the choked Ichhamati Water channel. This will ease the pressure on the Churni. For the protection of fish biodiversity and enhancement of fish production, a rational management program should be implemented for the Churni river. Arresting environmental hazards resulting from lack of sanitation facilities, encroachment, elimination of indigenous aquatic flora, fauna are some of the burning problems of the river that needs to be tackled through participatory mechanism.

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