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# River management in Bangladesh: a people's initiative to solve water-logging

GENERAL SECTION

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## Introduction

During the last few years, newspapers have been publishing daily reports about the suffering caused by water-logging in the south-west coastal region of Bangladesh. Environmental disasters such as water-logging, the silting-up of rivers and salinity have become common occurrences in our region and are causing unimaginable suffering for the people.

In the backdrop of the government's failure to solve this crisis, the people had taken up alternative drainage concepts on their own. For example, in the case of Dakatia *beel*, the mass involvement of local people to solve the water-logging problem has been internationally acclaimed.<sup>1</sup>

The people were pressing hard for the formulation of an environmentally friendly project to mitigate the water-logging problem. But the Bangladesh Water Development Board (BWDB) failed to propose any project which would take

proper account of the existing eco-system. The latest project aimed to mitigate water-logging is the Khulna-Jessore Drainage Rehabilitation Project (KJDRP). At the very start in 1993–94, local people expressed their doubts about the effectiveness of the project. The people apprehended that the project, if implemented, would worsen the situation. So they kept demanding a review of the KJDRP.

This relentless advocacy ultimately convinced the Asian Development Bank (ADB) to critically review the KJDRP and, on the basis of the people's demand, they agreed, albeit partially, to go for an eco-technological solution to the water-logging problem: the Tidal River Management (TRM) concept. This resulted in some alteration of the drainage plans, in the context of specific ecological characteristics of the south-west coastal region. This report contains a brief account of the phenomenon of water-logging, its causes and effects, of the government projects in the zone, and the people's movement to solve the problem.

## Background

### An introduction to the area

The study area is in south-west Bangladesh in the greater Khulna and Jessore districts, excluding parts of Sundarban. The total area is about 8,000 sq. km.

The region's climate is salt-laden air throughout the year, especially when winds blow from the sea, getting more and

<sup>1</sup> A *beel* is a natural depression. Bangladesh being a deltaic country, all the land in the plains have been formed by sediments carried down by the Ganges, Brahmaputra and Meghna river systems. Depressions are formed by numerous causes, some of which are explained below:

- Subsidence of topsoil caused by creation of a vacuum below by decomposition of organic substances mixed with silt.
- Subsidence caused by tectonic movement.
- Non-destructive floods deposit sediments close to the riverbank. Such repeated deposits raise the level of land close to the riverbank. But the land between two rivers remains low-lying. Such a low-lying land is also known as a *beel*.

**“From their own experience and observation, people identified the polders as the main cause for water-logging and began to present their reasoned arguments for breaching or cutting away polders to allow tidal flows for solving the problem”**

more humid and salty to the south. The four distinctive seasonal weather patterns are: dry winter season, pre-monsoon season, monsoon season and post-monsoon season. The dry winter season from December to February has infrequent rains, and river water becomes saline. The pre-monsoon and post-monsoon seasons are transitional periods, covering the months of March to May and October to November. During these two periods, cyclonic storms rise from the Bay of Bengal. The cyclones during the post-monsoon period are usually more destructive.

The maximum and minimum temperatures usually range from 29°C to 4°C and 5°C to 15°C. Average annual rainfall during the period 1965 to 1990 was about 1750mm. The relative humidity ranges from 64–75% in the dry season and 75–87% in the wet season.

The area is mainly drained by a number of north-south flowing rivers. From east to west, important rivers are the Gorai-Madhumati-Baleswar, the Bhairab-Pusur, the Bhadra-Gengrail, the Hari-Teka-Mukteswari, Sibsa, the Kabadak-Betna system and the Jamuna-Ichamati-Kalindi rivers. Most of the rivers are tidal in nature. East-west rivers interconnect the north-south rivers. Flows of these east-west rivers are very important for the complete circulation of tide all over the tidal flat. In the rainy season, water becomes fresh to slightly salty and in the dry season, it becomes salty. Most of the river waters carry appreciable amounts of suspended sediments.

The inland rivers represent the remaining channels of the old spill or regional rivers, which have lost their connection to the mother river, the Ganges. The Kumar, Nabaganga, Kabadak, Bhairab are good examples of such inland rivers. The inland and regional rivers run into tidal rivers or estuaries mentioned above. In the greater Khulna area, the coastal rivers or estuaries are saline because of low freshwater discharges, especially in the dry season. The river flow regimes are driven by high, variable sediment loads. The rivers of this region show a continuous process of silting gradually from the NW towards the SE direction.

**A silted-up river is dredged**



Photo: CDP

#### Physical characteristics of the area

Important physical characteristics are: peat basins, tidal food plain and the Ganges floodplain. The subject of this article is limited to the tidal floodplain.

The tidal floodplain is bounded in the north by the Ganges floodplain and in the south by the Sundarban mangrove tidal forest. The tidal floodplain is strongly influenced by tide, salinity and rainfall. This plain is also criss-crossed by numerous tidal creeks or channels and has high drainage density. The average tide difference is about two metres. Most of the areas are between one to three metres above mean sea level and have a southward regional slope.

The water and the soil are saline but in the rainy season salinity becomes low. Fresh water flows from the upstream regions and the tides normally control the salinity of this region. The major portion of the floodplain is low-lying, barely one metre above mean sea level and below high tide level. Homesteads, roads, vegetable gardens and orchards were developed on areas artificially raised by digging ponds and ditches.

#### Historical background: water-logging and river management

Daily tides used to inundate the lowlands twice a day. The Sundarban mangrove forest drops an average of 3.5 million tons of waste per year. This is carried by the tides throughout the floodplain. This waste and the stubble of the previous season's rice crop decompose in the water and produce nutritious organic food for all forms of aquatic life. When deposited on the land along with the heavy loads of silt carried by the tides, it also enriches the soil, and the silt compensates for the normal subsidence of the loose delta soil.

Since the 17th century, the *Zamindars* (landlords) used to

**Flooded crop field due to water-logging**

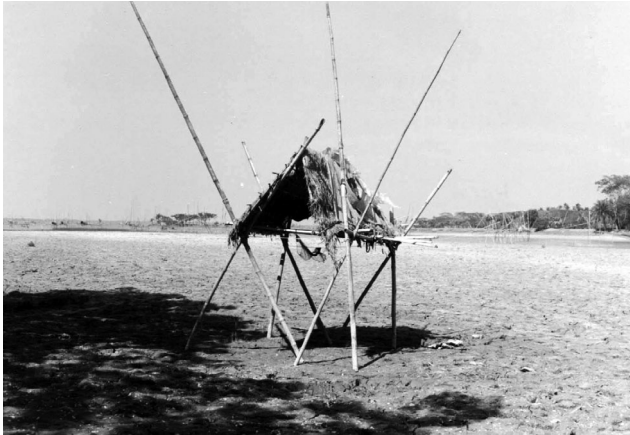


Photo: CDP

build low earthen dykes around the tidal flats to prevent tidal intrusion and wooden sluices to drain off surplus rainwater.<sup>2</sup> Their tenants then cultivated indigenous varieties of flood-tolerant and saline-tolerant rice, and reaped bumper harvests. After the harvest, the dykes and sluices were dismantled, and the people grazed cattle and fished in the tidal floodplains.

Thus, the environment, eco-system and bio-system that evolved in the coastal area were in balance. The problem of crop failure still existed, as dykes were not sufficiently high and strong. Opening the sluice gates was not enough and the gates were weak. These were temporary structures and needed repair every year.

After abolition of the *Zamindari* system, the maintenance of these structures became disrupted. As a result, the land-water management problems became serious and crop failure occurred frequently. In 1959, to solve this problem, a big programme of construction and maintenance of permanent polders was undertaken by the then government. In the Khulna and part of the Jessore districts, 39 polders (1,014,100 acres) were constructed (Aftabuzzaman, 1990).<sup>3</sup> The main objectives were to protect the arable lands from tidal inundation and flooding, and to increase crop production.

In 1984, *Dakatia beel*, a part of one polder became water-logged for the first time, due to rapid siltation of the Solmari, Hamkura and Hari rivers. Later this problem spread to even more polders. Moreover, lands outside the polders in the greater Jessore district went under water. This problem is gradually creeping to the northern part as well as in the southern part of the embankment area.

<sup>2</sup> Dyke: an embankment of earth and rock or a drainage ditch built to prevent floods.

<sup>3</sup> Polder: an area of low-lying land, that has been reclaimed from a body of water and is protected by dykes.

### Effects of water-logging

Only an insignificant area of land is cultivable in the dry season. Water-logging destroyed houses, disrupted communication and the rhythm of daily life, killed off fruit trees and reduced the number of domestic animals. Because of water-logging, the fuel crisis became acute. The collection of wood fuel and drinking water became increasingly difficult; human waste was thrown into water in the absence of dry land and farmers turned into fishers as agricultural lands were submerged. Many migrated to other areas as life became difficult to support. The pollution caused by the stagnant waters created epidemics of water-borne diseases. Schools closed and children were deprived of education. Hundreds of thousands lost their occupations and became destitute.

### The people's initiative to address the issue

Fifteen years after the construction of the coastal embankments, water-logging began to emerge in the polders upstream in this region. The people of the water-logged area petitioned the authority to solve the problem. As the authority paid no heed to their grievances, people themselves took the initiative to organise and mobilise the community, and devise plans for solving the problem. From their own experience and observation, people identified the polders as the main cause of water-logging and began to present their reasoned arguments for breaching or cutting away polders to allow tidal flows. Their logic was that if tidal flows can be made free, the navigability of the rivers will be restored, the enclosed lands will be free from water-logging, alluvium will accumulate inside the polders, and as a result the level of land will rise. The first manifestation of this logic was seen in September 1990, when the polder of *Dakatia beel* was breached in four places. This concept is called the Tidal River Management (TRM) system.

### The consequences of the people's action and the value of popular wisdom

Through one of the four cuts made in the embankment, *Dakatia beel* was again connected with the river Hamkura. Through regular tidal actions and the accumulation of alluvium, the land formation process resumed. Within two years from 1990–1992, 2,500 acres of *char* (newly risen) land emerged. We saw rice being cultivated in the *char* lands in October 1992. Popular wisdom was reflected in the fact that the resumption of tidal action restored the balance that was lost when the supply of alluvium was cut off from the polder by the embankment.

The experience has proved that if people take initiatives to

face their problems, they can expose the faults of any large engineering work that concerns their lives and livelihood.

#### Social impacts of the Dakatia *beel* movement

The success in draining out water of Dakatia *beel* encouraged people in adjacent water-logged areas. They organised themselves and formed committees at different levels and took initiatives to turn their water-logged land into agricultural land again. Madhukhalir *beel* and Patra *beel* are examples of such collective efforts. However, these efforts could not achieve the desired results at every stage because of a lack of proper organisational structure and planning.

However, the people's initiatives and innovative ideas drew the attention of the policy makers and donor agencies. They began taking people's involvement in solving the problem of water-logging quite seriously.

In the meantime, the Bhabadaha area (Jessore zone) started to experience widespread water-logging. The people of the area organised themselves and removed the accumulated silt from the exit of the Bhabadaha sluice gates every year, and opened a narrow drainage channel. Each year, they retrieved more land for agricultural production.

#### Tidal River Management (TRM): lesson learnt from people

The people developed the Tidal River Management concept (TRM) to mitigate the water-logging problem of this region.

The main purpose was to get suspended sediment deposits gradually under a controlled system, going from tidal channels up to the mean high tide level in the water-logged areas. This planned system means that deposits will be made in a certain site by a specific tidal channel. Later on, deposit sites may be shifted to other sites according to the topography of the area. Breaches may be shifted to ensure uniform silting within a basin. Depending upon the position of the water-logged areas, different methods of TRM may be adopted for different types of basins.

#### Practical examples of TRM

After the breaching of the embankment of Dakatia *beel*, the Hamkura river became a strongly flowing river 300 feet wide and 30 feet deep at the new highway bridge on the Khulna-Chuknagar Road.

The people there learnt from the Dakatia *beel* experience and tried the TRM concept on Bharter *beel*, Golner *beel*, Bahadurpur *beel*, Magurkhali *beel*. The experiments proved successful.

#### Over-flooded river due to drainage congestion



Photo: CDP

#### Bhaina *beel*

On 29 October 1997, the people breached the right embankment along the Hari River a short distance above the Sholgati to allow free access of tides to Bhaina *beel*. Interviews with local people, and a field visit in August 1999, showed that the average width of the Hari River downstream of the cut had increased by three times more than it had before the cut. The depth of the Hari River near Sholgati Bazar is about 35 feet. Upstream of the cut there is no silt in the water and water from the upstream *beels* drain out easily and they became partly free of water-logging.

TRM is still a conceptual idea developed by non-governmental organisations, later supported by the Environmental and Geographic Information Service (EGIS) and formulated by the Snowy Mountains Engineering Corporation (SMEC)<sup>4</sup>, but still it has some practical lessons based on the experience gained from Dakatia *beel*, Bhaina *beel* and other small *beels*.

#### Government projects to solve water-logging

When the affected people had rejected the Coastal Embankment Rehabilitation Project (CERP) and its successor CERP-2, the BWDB came up with the ADB-funded US\$ 62 million Khulna Jessore Drainage Rehabilitation Project (KJDRP).

#### Khulna-Jessore Drainage Rehabilitation Project (KJDRP)

With an initial estimated expenditure of US\$62 million, it was the largest project of its kind taken up so far. The declared aim of the six-year project was to 'solve the water-logging problem to increase agricultural production and alleviate poverty of the area through farm-based employment generation.'

The project implementation authority hopes that if the

<sup>4</sup> SMEC is a sister concern of SMEC Pty Ltd. of Australia, and has been engaged in development activities in Bangladesh for several years.

### Local affected people reviewing KJDRP drainage plan



Photo: CDP

project is implemented in time, about 100,600 hectares of land in 68 unions under eight *thanas* will become free from water-logging.<sup>5</sup> As a result, about 800,000 people would benefit from a poverty-free and healthy life.

But the plans had to be revised in the face of people's resistance and advocacy of NGOs. Later on a new drainage plan was taken up on the basis of the study by EGIS.

### Advocacy of the NGOs

When the BWDB presented the plan for KJDRP, NGOs under the initiative of Uttaran opposed the proposals and demanded guaranteed people's participation in all stages of the project – from designing projects to their implementation – and that drainage plans should be ecologically sound. The Association of Development Agencies in Bangladesh (ADAB), the national coordinating body of NGOs, and the Coalition of Environment NGOs (CEN) performed leading roles in the campaign. Widespread media campaign and a TV film broadcast over Bangladesh Television helped the advocacy to a great extent. The ADB suspended the implementation of the project in the face of continuous efforts of NGOs and the people's movement, to be taken up later subject to environmental and social impact studies (EIA & SIA), and scrutiny of their findings.

### Asian Development Bank's later position

An ADB mission visited Dhaka from 29 August – 1 September 1999 to discuss with the Government of Bangladesh (GoB) the latest stage of implementation of the KJDRP.

Based on the feedback of the project beneficiaries and suggestions received from the stakeholders, the ADB studied

<sup>5</sup> Phultala, Metro, Batiaghata and Dumuria *thanas* of Khulna district, and Sadar, Abhoynagar, Keshabpur and Monirampur *thanas* of Jessore district.

**“As a result of the people's movement and the NGO's advocacy programme, the KJDRP has been compelled not only to review the proposed drainage project, but also has agreed on the Tidal River Management concept, at least partly’**

the TRM option in greater detail in terms of both technical feasibility and environmental and social impacts. They found that the **‘TRM approach is technically feasible and attractive from social and environmental points of view’**. So the ADB decided to reformulate the project, taking into account the views of stakeholders. The government and BWDB have accepted the TRM option (according to their understanding).

The BWDB decided to develop one temporary tidal basin (Kedaria *beel*) in the north-western part of the project area, while managing, improving and closing the existing basin in Bhaina *beel* (which is reaching the end of its useful life). The BWDB also decided to drop the Kashimpur and Tiabunia regulators from the project.

The NGOs and people's organisations continued to advocate for the adoption of the TRM concept for the whole project area. But the BWDB limited the TRM to the small Kedaria *beel*.

Though according to the original schedule, the KJDRP should have been completed by the end of 1999, due to various delays, the project finally came to a close on 31 December 2002, with the TRM concept implemented only in an infinitesimally small area in Kedaria *beel*. **However, the BWDB now admits that the TRM is the best strategy for mitigating water-logging.**

Now the focal point of the advocacy is to organise the people in favour of the Tidal Basin concept and to ensure the participation of the people in the decision-making process at all stages.

### Lessons learnt: people break the barriers

A number of lessons can be learnt from the progress of this advocacy.

- Mere economic considerations (e.g. enhanced production of high yielding varieties of rice) should not encourage policy makers to adopt structural development projects, totally ignoring long-term environmental consequences.
- In the highly sensitive and fragile environment of the south-west coastal region of Bangladesh, where the lives and

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livelihoods of the vast majority of the people depend to a large extent on the sustainability of the ecology, traditional wisdom and experience of the people must never be ignored. Policy makers should not be misguided by the so-called 'highly-educated experts'. In matters of problem identification, design and implementation, full play must be given to decentralisation of the society, economy and polity in order to avoid the pitfalls that have already fallen on the region.

- Previously the government had undertaken the Coastal Embankment Project without taking into consideration its environmental impacts. As a result, a whole range of economic disasters such as water-logging and silting of rivers has enveloped the region. In turn, it brought about sufferings of unprecedented magnitude to the people. But the concerned authorities have tried to find solutions to those problems based on the same rigid perspectives and have failed time and again.
- On the other hand, the people, on the basis of their traditional wisdom and practical experience, have devised effective eco-technological strategies to successfully deal with the situation.
- In any rural scenario, and especially in such a highly sensitive region as this, there is a strong linkage between the state of the environment and development. Short-term economic returns cannot compensate for a damaged environment. The people of the region have been contending with the forces of nature for generations, and they know best what is good for them. So due respect may be paid to their views and perceptions.
- The NGOs, if they are to serve the people and implement development activities, must be environmentally knowledgeable. People's development cannot be achieved by ignoring environmental issues and implementing development projects in a copycat manner. Such a perspective will be like filling water into a leaky bucket.
- The principal lesson learnt from the experience of this advocacy campaign is that NGOs working in the region must develop empathy with the people and adopt the perspective of the people as their own; only then will it be possible to alter the points of view of high level policy makers.

### Still a long way to travel

The abstract of this report reflects the fact that the time has not come to say the last word about the final development of the NGO's advocacy for a sustainable drainage plan of KJDRP. Though some victory has been achieved, the reality is that the KJDRP is apparently 'convinced' of the TRM concept,

**A water-logged village**



Photo: CDP

but no full-scale investigation and data collection work has been done on the physical, environmental and other aspects of the coastal region. In the meantime, the KJDRP has completed its designated project period of six years with the other, objectionable, components still intact.

KJDRP authorities themselves have admitted that their previous proposed 'drainage plans' are not based on adequate investigation. That only raises doubts about the effectiveness of the drainage plans. The drainage programmes that have so far been implemented on an emergency basis have failed to attain their desired goal on the one hand, and created new water-logging and river silting problems on the other. The programmes have also failed to gain people's confidence. People have themselves taken a number of measures to solve the problem of water-logging, and have registered their angry protests against many components of KJDRP's drainage plans that have failed to bring the environmental features into consideration. These plans have only replicated the rigid methodology of the earlier coastal embankment plans, especially their attitudinal aspects. Environmentally conscious local NGOs are conducting their advocacy programme based on this issue. This is such an innovative concept that it has no equal in Bangladesh. The advocacy programme has been started from the lowest grassroots level.

As a result of the people's movement and the NGO's advocacy programme, the KJDRP has been compelled not only to review the proposed drainage project, but also has agreed on the Tidal River Management concept, at least partly. Because of wrong decisions, many obstacles have been created in the process of implementing the programme. The people of *Dakatia beel* are continuing their movement to stop the construction of regulators on the Sholmari river and to restore tidal flow in the region, but in vain.

It is imperative to properly realise the uniqueness of the

**A non-functioning regulator**

Photo: CDP

coastal environment and to identify the areas where investigation and research activities can be taken up.

The region has been subjected to different kinds of environmental imbalance and natural disasters ever since the implementation of 'development' projects that are clearly at odds with the region's environmental characteristics, and are ecologically unsound.

No holistic attempt at investigation and research has been made to ascertain the negative impacts of river silting, water-logging, salinity and other disasters on the life of the people – especially women and children – and on their economic and family lives, on education, health, and hygiene. Yet, this is a task that cannot be neglected.

We must therefore take a correct approach towards the development of the coastal region. Isolated mechanical and technological approaches that have no consideration for the environment will necessarily fail to address the uniqueness and the problems of the coastal region. Only an eco-technological approach may bring about real development of the region.

The authority, entrusted by the people as policy makers and governors of the country, must be adaptable to the advocacy campaign. They should develop the concept that 'ordinary people have the democratic right to say something about technical projects that may profoundly affect their lives and livelihoods.'

People's voices should be honoured. But the reality is different and painful. The NGO's advocacy campaign has not only been ignored, but it has been misinterpreted. It has been subjected to harassment and humiliation.

Based on our discussion so far, we may draw two important conclusions:

- the widespread application of the objective, technological knowledge of the West has not been fruitful in all cases; and
- development processes must ensure the involvement of the people.

Local people have been trying to take part in decision-making processes. Foreign experts come and go but they have no stake in the environment in which they apply their knowledge and skills. But the local people do. They have to stay there and survive. Any change in the environment profoundly affects local communities and the lives of the people. Therefore, if local communities have to achieve desired progress, they have to have more power in taking decisions. Abstract facts, data, and debates on different issues should be made simple, so that people can easily understand these issues, and realise their own roles in the development of their region, as well as the consequences that might follow, and what they should do in such eventualities.

All the organisations and agencies connected with the different stages of the development process have the responsibility of promoting such a people-oriented approach and the ongoing advocacy campaign reflects this.

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